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Low-Cost  
Solar Array Project

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# Handbook of Solar Energy Data for South-Facing Surfaces in the United States

Volume I: An Insolation, Array Shadowing,  
and Reflector Augmentation Model

Jeff H. Smith

(NASA-CR-162998) HANDBOOK OF SOLAR ENERGY  
DATA FOR SOUTH-FACING SURFACES IN THE UNITED  
STATES. VOLUME 1: AN INSOLATION, ARRAY  
SHADOWING, AND REFLECTOR AUGMENTATION MODEL  
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by  
Jet Propulsion Laboratory  
California Institute of Technology  
Pasadena, California

(JPL Publication 79-103, VOLUME I)



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Aeronautics and Space Administration.

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major effort toward the development of low-cost solar arrays.

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## ABSTRACT

This handbook provides estimates of average available solar insolation to fixed, flat-plate, south-facing collector surfaces at various array tilt angles at numerous sites in the United States. This first volume contains average daily, total insolation estimates, by month, and annual totals for 235 locations. The second and third volumes contain the daily profiles by hour used to compute the daily totals for the 235 locations (at selected array tilt angles).

A model that estimates the direct, diffuse, and reflected components of total insolation on an hourly, daily, and monthly basis is presented. A shadow loss model and a reflector augmentation model providing estimates of the losses and gains associated with various fixed array geometries are also described. These models can be used with the insolation model provided or with other recorded data.

A FORTRAN computer program with user's guide is presented. The program can be used to generate additional handbook values or to examine the effects of array shadowing and fixed reflector augmentation effects on a daily, monthly, or annual basis. Array shadowing depends on location, array size, array tilt, array separation, and time. The program can be used to examine trade-offs between array spacing and insolation losses due to shadowing. The reflector augmentation program can be used to examine trade-offs among array size and tilt, separation, and reflector tilt to determine the combination of design values that optimize the economic objectives or technical criteria of the system.

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Thanks is extended to the Low-Cost Solar Array Project at JPL and especially to Donald Rapp, Paul Sutton, and Peter Tsou, whose numerous suggestions and encouragement helped make this handbook a reality. The author would also like to acknowledge the assistance of Glenn Zucman, who verified the insolation model with an APL program.

FIG. 14 ATTENTION MAY BLANK

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\*Appendix D is in Volumes II and III

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## GLOSSARY

$\phi$	latitude angle
$\delta$	declination angle (tilt of Earth with respect to plane through equator of sun)
$\tau$	array tilt angle from horizontal
$\beta$	reflector tilt angle from horizontal
$\omega$	sun hour angle, $0^\circ$ at solar noon, negative in the morning and positive in the afternoon; the Earth rotates through an angle of $\Delta\omega = 15^\circ$ each hour
$\epsilon$	solar altitude angle
$\theta_t$	incident angle between direct beam of sun and normal to surface of array
$\alpha$	azimuth angle ( $0^\circ$ for north, measured clockwise)
$Z$	zenith angle between direct beam of sun and vertical
$I_c$	solar constant ( $1.377 \text{ kW/m}^2$ )
$\omega_s$	sunrise hour angle
$\bar{K}_T$	the total daily radiation on a horizontal surface (measured) at ground level divided by the total daily extraterrestrial radiation on a horizontal surface (computed) (i.e., the fraction of the total daily insolation penetrating the atmosphere); computed for each day in the month and condensed into an average that represents a "typical" day for the month ( $\bar{H}/H_0$ )
$\bar{K}_d$	the fraction of total daily extraterrestrial radiation on a horizontal surface (computed) reaching the Earth's surface as diffuse (scattered) radiation on a horizontal surface (measured); computed for each day of the month and condensed into an average that represents a typical day for the month ( $\bar{H}_d/H_0$ )
$\bar{H}$	the average daily total radiation reaching a horizontal surface on the ground (measured) during a given month
$H_0$	daily total extraterrestrial radiation on a horizontal surface for a given month
$\gamma$	monthly adjustment to the solar constant to account for Earth-sun distance variation

$B$	atmospheric absorption coefficient
$\bar{H}_d$	average daily total terrestrial diffuse radiation on a horizontal surface for a given month
$r_d$	fraction of total daily extraterrestrial radiation reaching the ground as diffuse radiation during a given hour $\omega$ on a horizontal surface
$\bar{I}_{dh}$	average hourly terrestrial diffuse radiation on a horizontal surface for a given month
$\bar{I}_{DN}$	average hourly terrestrial direct normal radiation for a given month
$\bar{A}$	adjusted average daily terrestrial direct normal radiation for a given month
$\bar{I}_{Dh}$	average hourly terrestrial direct radiation on a horizontal surface for a given month
$\bar{I}_{Th}$	average hourly terrestrial total radiation on a horizontal surface for a given month
$\bar{I}_{Dt}$	average hourly terrestrial direct radiation on a fixed tilted surface for a given month
$\bar{I}_{dt}$	average hourly terrestrial diffuse radiation on a fixed tilted surface for a given month
$\bar{I}_{rt}$	average hourly terrestrial diffuse radiation from ground reflectance for a given month
$\bar{I}_{Tt}$	average hourly total terrestrial radiation on a fixed tilted surface for a given month
$\rho$	ground reflectance of surrounding area
$\rho'$	spectral reflectance of rack-mounted arrays
$d$	array spacing
$a$	array surface length
$F_s(\omega)$	shadow loss fraction during hour angle $\omega$
$R$	reflector length on reflector augmented racks

Note: The phrase "average hourly/daily...for a given month" indicates that the value represents an average hour or day during the given month (not the total number of average hours or days in the month).

## SECTION I

### INTRODUCTION

This document is designed for engineers, designers, and homeowners. For the homeowner this handbook provides a quick reference for obtaining estimates of available solar insolation for numerous locations and array tilt angles. For the engineers and designers it provides a model and computer program that considers the effects of array shadowing and reflector augmentation as design variables.

The first objective of this publication is to provide a handbook reference document for estimating available solar insolation on south-facing fixed surfaces. The user interested in such data is referred directly to the Appendices. Hourly and daily insolation estimates are provided for 235 U.S. sites at a variety of array tilt angles. In the event the tilt angle is to be adjusted monthly or fixed at some intermediate angle other than the handbook angles, a computer program is provided to aid the user with more detailed requirements. The computer program is based on a parametric solar insolation model that takes into account the site specific solar climate of a particular location. (This document does not consider tracking surfaces although the computer program in Appendix A could be modified to do so.) The computer program enables the engineer/designer to conduct extensive sensitivity analyses on the orientation and location of solar collectors.

This publication is directed toward the engineer/designer who is interested in average insolation estimates that represent the typical solar climate of a particular site. In this sense, the model presented here is an "aggregate" model and does not attempt to model the atmospheric physics in a detailed fashion. In particular, hourly trends within a day are not modeled; that is, a symmetric daily profile is presented. The latest available input data required by this model are provided in Appendix B of this document.

The second objective of this publication is to address insolation problems specific to residential/commercial applications. Specifically, it is concerned with the placement of solar collectors on residential housing units and commercial properties (shopping centers, parking lots, etc.) where the amount of space available for collectors is limited by shadowing problems, energy output requirements, and costs. The array spacing problem is also relevant to central station solar power plants although spacing may not be as critical due to the larger land areas involved. The document addresses the relationships among available insolation, spacing, and shadowing for south-facing surfaces -- the costs associated with various spacing arrangements are not addressed. The reflector augmentation problem is related to the shadowing model. Given a tandem rack array design (see page 4-2), a reflective surface built into the support structure of the arrays yields a higher level of insolation at the collector surface. The insolation available to such a surface depends not only upon the



amount of reflector augmentation, but also on array spacing and sun elevation angles at which shadowing occurs.

A multipurpose package of programs has been written based on the models presented in this report. Details of this package may be found in Section VI and Appendix A. For the user interested in south-facing fixed-surface data, Appendices C and D contain data for 235 sites. Shadowing and reflector augmentation data are not presented due to the many possible combinations of input parameters. In order to obtain insolation estimates that consider shadowing and reflector augmentation, Sections VI and Appendix A should be consulted for directions on how to run the program.

It should be noted that the modeling of the spectral response of photovoltaic cells by time of day and type of material has not been considered here due to the complexities associated with modeling light spectrum changes. This is discussed more in Section II.

Sections II, III, IV, and V present the models used to generate the handbook data and computer program package as well as a discussion of the assumptions and accuracy of the techniques. A careful examination of these Sections is advised prior to altering the computer program.

## SECTION II

### THE INSOLATION MODEL

There are basically two ways that solar radiation data can be used for design purposes in the photovoltaics area. One way is to use past hourly recorded data for a particular site or similar locality and estimate through computer simulation what the performance of the system and its components would have been under these historical conditions. Future performance can then be predicted based on this historical analysis. The second method is to use data that correspond to specific types of days (clear, average, "typical," etc.) to calculate the performance of the system and its components.

The first method can account for the transient nature of the process. However, the use of this technique is limited by the cost and complexity associated with the use of detailed models and computer programs and the almost complete absence of good hourly data for solar radiation on tilted surfaces. The primary source of solar radiation data in the United States is the National Weather Service and its network of stations. Data collection began in 1902 with the first measurements of the direct component of the solar radiation at normal incidence being made in Asheville, N.C.

Until 1977 there were 86 stations covering the United States and the West Indies. However, due to errors in data collection and instrument calibration, the accuracy of these data was not guaranteed. Reference 1 gives a complete history of the network. In 1977 a new network with approximately 30-35 stations was established with the aid of the U.S. Department of Energy. This network collects only horizontal surface (direct, diffuse, and total) data by hour.

With the increasing emphasis on the development of solar energy use, much of the past solar radiation data has been rehabilitated. Major work has been done in an effort to smooth the data record using models to fill in gaps due to missing data or improperly calibrated instruments. The acronym used to describe this new data base is SOLMET (Reference 2), which consists of solar and meteorological data for 27 sites throughout the United States.

The second method -- using solar radiation data for specific types of days and orientations -- has the advantage that computing insolation estimates for surfaces of arbitrary orientation is a simple computational procedure. However, the input data required are aggregated solar insolation measurements. The approach adopted here was to use the latest available SOLMET derived input data to calibrate an average or typical day insolation model and thus combine the advantages of both methods.

## A. NOMENCLATURE AND ASSUMPTIONS

The model presented here yields insolation levels for "typical days" -- a term with specific meaning. The method of procedure may be outlined as follows. The amount of solar radiation intensity outside the atmosphere is relatively constant, so the "typical" amount selected for a given month is the quantity around the midpoint (15th or 16th). The proportion of this radiation that actually reaches the Earth's surface varies from day to day (hour to hour, in fact) depending upon the weather characteristics of the location. The amount of solar radiation reaching the Earth's surface during a given month, divided by the total radiation outside the atmosphere during the given month, is used as an estimate of the average or "typical" fraction of radiation reaching the ground. The direct, diffuse, and reflected components of the total radiation are derived from this fraction and are referred to as typical estimates since they represent the available insolation one could expect on any day in the particular month. Thus, all estimates generated by the model are estimates of the long-run average insolation.

A number of assumptions are associated with the use of this model. First, it is assumed that most of the diffuse radiation comes from an origin near the sun. In other words, the scattering of the solar radiation is mostly forward scattering. Second, it is assumed that the diffuse component is uniformly distributed over the sky. In general, for clear days there is little variation in diffuse solar radiation across the United States.\* However, while this may not be true for particular partly cloudy days, it is probably sufficient for the "typical" estimate. It is further assumed that the effects on the average total insolation of tilting the surface (Reference 3) are accounted for by the atmospheric attenuation adjustment contained in the model discussed later.

## B. PREVIOUS WORK

Liu and Jordan (References 4-6) conducted extensive analyses during the early 1960s on the available solar radiation data and developed an approach that can be used to estimate the available daily solar radiation for each month of the year for numerous locations in the United States and Canada. Using this approach, it is possible to take the daily total radiation on a horizontal surface, divide the daily total into its direct and diffuse (scattered radiation) components, convert each component into hourly values, and then compute the hourly value of either component on a surface of any orientation desired. In addition, with the availability of the rehabilitated SOLMET data, the calibration of this model has been extended and improved.

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\*This can be seen in the relationship between  $\bar{K}_T$  and  $\bar{K}_d$  (page 2-7) where the percentage of the total daily extraterrestrial radiation that reaches the ground as diffuse ranges from 12% to 19%.

This Section presents a version of the Liu and Jordan model modified by Kusuda and Ishii at the National Bureau of Standards (Reference 7) to account for early morning and late afternoon errors. These errors are caused by increased atmospheric absorption of the direct radiation beam at extreme sun-hour angles. (During early morning and late afternoon, the direct radiation must pass through a longer length of atmosphere.) The model was adapted to allow for varying array orientations and the algorithm for calculating the total radiation on a tilted surface follows. Furthermore, the model has been updated to include the most recent insolation input data and the revised solar constant ( $1.377 \text{ kW/m}^2$ ). The model yields hourly solar radiation values for a given site location (latitude), month (declination), tilt angle, array orientation, and reflectivity. A number of examples are presented in Appendix A of this report.

### C. CALCULATION PROCEDURE

The calculation procedure is a modification of a method developed by Kusuda and Ishii, which is based on the historical model of Liu and Jordan. For brevity, the approaches are presented in combined form. Details may be found in Reference 7.

The relevant relationships derived by Liu and Jordan (References 4-6) are:

- (1) The monthly average daily diffuse radiation on a horizontal surface as a function of the monthly average daily total radiation on a horizontal surface;
- (2) The ratio of the hourly diffuse radiation to the daily diffuse radiation (both on a horizontal surface) as a function of the number of daylight hours;
- (3) The ratio of the hourly total radiation to the daily total radiation (both on a horizontal surface) as a function of the number of daylight hours.

The relationships were based on available solar radiation data from Blue Hill, Mass.; Nice, France; Helsingfors, Finland; and Kew Observatory, London, England. More recent data have led to minor adjustments in the diffuse component relationships (Reference 8). However, comparisons of these adjustments are inconclusive due to the small differences involved and the limited data. The approach used here retains the original Liu and Jordan results for the diffuse component.

Liu and Jordan (References 6, 9) also compiled for each of 12 months, at 80 different locations in the United States and Canada, the "average" daily total radiation on a horizontal surface ( $\bar{H}$ ) and the ratio  $\bar{K}_T = \bar{H}/H_0$ , where  $H_0$  is the daily total extraterrestrial radiation on a horizontal surface calculated for the 15th or 16th of each month. It should be noted that the choice of the midpoint of the month is somewhat arbitrary since the monthly variation in daily extraterrestrial

radiation is only +1.5%. Using the rehabilitated SOLMET data base, the National Climatic Center has updated the data used for computing the  $\bar{K}_T$  fractions (Reference 10). Using regression models, the data base has been extended to cover 248 locations. These values were used to generate the 235 selected handbook sites in Appendices C and D. Since the  $\bar{K}_T$  values are site specific and reflect the cloudiness and weather conditions of the site, they more accurately represent the expected insolation levels than do the so-called "clear day" estimates of the earlier literature in this area. The  $\bar{K}_T$  ratio represents the fraction of the total average daily extraterrestrial radiation that is transmitted through the atmosphere and thus provides a useful index for the solar climate of a particular location.

The step-by-step technique for using the above relationships to compute the incident solar radiation on a horizontal or tilted surface follows. Figures 2-1a and 2-1b illustrate the relevant angles involved in the procedure.

### Step 1

The average daily total extraterrestrial radiation ( $H_0$ ) on a horizontal surface for a given site (latitude) and month (declination angle) must be calculated first. This calculation will give the total available radiation on a horizontal surface before the radiation beam passes through the atmosphere and is broken into its direct and diffuse components.

The expression is:

$$H_0 = \frac{24}{\pi} \times \gamma \times I_c \times (\cos \phi \times \cos \delta \times \sin W_s + W_s \times \sin \phi \times \sin \delta)$$

where

$H_0$  = daily total extraterrestrial radiation on a horizontal surface (kWh/m<sup>2</sup>/day)

$\gamma$  = ratio of solar radiation intensity at normal incidence outside the Earth's atmosphere to the solar constant (monthly average values are given in Table 2-1)

$I_c$  = solar constant, 1.377 kW/m<sup>2</sup>

$\phi$  = latitude, radians\*

$\delta$  = solar declination angle, radians; monthly values are given in Table 2-1; the declination is the angular position of the sun at solar noon with respect to the plane of the equator (north positive)

$W_s$  = sunrise hour angle (radians) =  $\cos^{-1} (-\tan \phi \tan \delta)$

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\*Degrees are converted to radians by multiplying by  $\pi/180$ . All the trigonometric functions used here require radian arguments.

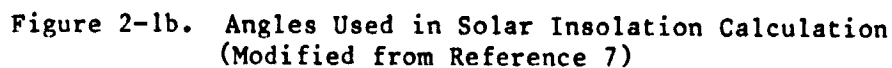
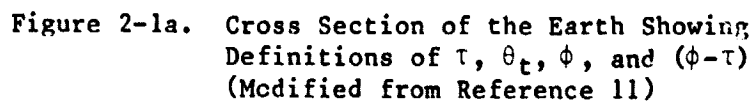


Table 2-1. Solar Declination ( $\delta$ ), the Ratio of Solar Radiation Intensity at Normal Incidence Outside Earth's Atmosphere to the Solar Constant ( $\gamma$ ), and Atmospheric Absorption Coefficient (B) (Reference 7)

Month	Declination (Degrees . Minutes) $\delta$	Ratio $\gamma$	Atmospheric Absorption Coefficient B
1 January	-19.51	1.0300	0.142
2 February	-10.28	1.0207	0.144
3 March	0.20	1.0057	0.156
4 April	11.56	0.9875	0.180
5 May	20.14	0.9727	0.196
6 June	23.27	0.9670	0.205
7 July	20.26	0.9692	0.207
8 August	12.03	0.9785	0.201
9 September	0.37	0.9945	0.177
10 October	-10.47	1.0133	0.160
11 November	-19.58	1.0267	0.149
12 December	-23.27	1.0327	0.142

It should be noted that all times are expressed as angles of the sun's position relative to a vertical plane oriented north to south.

## Step 2

The next step is to obtain the monthly average daily total radiation on a horizontal surface,  $\bar{H}$ , from Reference 10 or other available sources and calculate the ratio:

$$\bar{K}_T = \bar{H}/H_0$$

The value  $\bar{K}_T$  represents the average fraction of daily total extra-terrestrial radiation that penetrated the atmosphere. If the value of  $\bar{K}_T$  is available, this calculation may be omitted. Appendix B contains a table of values for 235 locations in the United States (Reference 10) derived from the rehabilitated SOLMET data base.

## Step 3

Liu and Jordan determined the relationship between the fractions of extraterrestrial radiation that were daily diffuse ( $\bar{K}_d$ ) and daily total radiation ( $\bar{K}_T$ ) (on a monthly average basis) for any given month. This empirical relationship is given by:

$\bar{K}_T$	$\bar{K}_d$
0.3	0.179
0.4	0.183
0.5	0.188
0.6	0.174
0.7	0.149
0.75	0.125

For example, if 60% of the average daily extraterrestrial radiation is reaching the Earth at a particular location, 17.4% of the average daily extraterrestrial radiation which reaches the ground is diffuse (scattered by the atmosphere).

The  $\bar{K}_T$ ,  $\bar{K}_d$  relationship is used to determine the daily diffuse radiation on a horizontal surface,  $\bar{H}_d$ , by:

$$\bar{H}_d = \bar{K}_d \times \bar{H}_0$$

## Step 4

The next step is to take the daily value above and convert it to an hourly value. This is done by calculating the value of a factor,  $r_d$ , from the following equation that gives the fraction,  $r_d$ , of average daily extraterrestrial radiation that reaches the ground as diffuse radiation during a given hour:



$$r_d = \frac{\pi}{24} \times \frac{\cos \omega - \cos W_s}{\sin W_s - W_s \times \cos W_s}$$

where  $\omega$  = the hour angle corresponding to a given hour of the day (solar time), radians.

Note that the use of this relationship "smooths" the average daily diffuse profile into a symmetric function as mentioned earlier. Also note that solar time and standard time are different. Solar time is a local phenomenon, determined so that solar noon occurs when the sun is most nearly overhead. Thus, two observers displaced east and west of each other would measure different solar times at the same Pacific Standard Time (PST). The following table illustrates the relationship between solar time and hour angle:

	Solar Time	Hour Angle $\omega$ (Degrees)
	.	.
	.	.
	.	.
	10 A.M.	-30°
	11 A.M.	-15°
Solar Noon:	12 Noon	0
	1 P.M.	15°
	2 P.M.	30°
	.	.
	.	.
	.	.

Using  $r_d$ , the average hourly terrestrial diffuse radiation on a horizontal surface ( $\bar{I}_{dh}$ ) is the average daily diffuse radiation multiplied by the fraction available during hour  $\omega$ ∗:

$$\bar{I}_{dh} = r_d \times \bar{H}_d$$

#### Step 5

This step involves the calculation of the direct normal component of the hourly radiation adjusted to more accurately account for the larger amount of atmosphere the beam must pass through near the sunrise and sunset hours. The details of this procedure may be found in Reference 7.

\*A small d subscript indicates a diffuse component and a large D denotes a direct component. The second letter of the subscript denotes whether the surface is horizontal (h), tilted (t), or normal to the direct beam (N). A large T denotes total radiation amounts.

The value of the factor  $m$ , which represents a correction for the increased atmospheric absorption of the direct normal component, can be determined from Table 2-2.\* So, the hourly direct normal radiation is calculated using:

$$\bar{I}_{DN} = \bar{A} \times \exp(-B/\cos \theta_t) \text{ (with } \tau = 0 \text{)}$$

where

$\bar{I}_{DN}$  = average hourly terrestrial direct normal radiation (kWh/m<sup>2</sup>)

$\bar{A} = (\bar{K}_T - \bar{K}_d) \times f \times H_0$  (kWh/m<sup>2</sup>); the correction factor  $m = f \times H_0$  where  $f$  is a function of latitude and time of year

$B$  = an atmospheric absorption coefficient (see Table 2-1) that describes the varying beam attenuation by the atmosphere during the year

$\theta_t$  = the angle of incidence between the sun's direct beam and a normal to the array surface. It is this variable that takes into account the azimuthal orientation,  $\alpha$ , and tilt angle,  $\tau$ , of the surface.

The equation for  $\theta_t$  is derived from Reference 12:

$$\cos \theta_t = \begin{cases} (\sin \phi \times \cos \tau + \cos \phi \times \sin \tau \times \cos \alpha) \times \sin \delta \\ + (\cos \phi \times \cos \tau - \sin \phi \times \sin \tau \times \cos \alpha) \times \cos \delta \\ \cos \omega - \sin \tau \times \sin \alpha \times \cos \delta \times \sin \omega \\ \text{if } \cos \theta_t > 0 \\ \\ 0 & \text{if } \cos \theta_t \leq 0 \end{cases}$$

\*The computer program presented in Section VI of this document generates these  $m$  factors internally.

Table 2-2a. The Value of the m Factor (kWh/m<sup>2</sup>)

LAT.	MONTH											
DEG.	1	2	3	4	5	6	7	8	9	10	11	12
0.	1.77	1.74	1.74	1.77	1.81	1.83	1.83	1.81	1.77	1.77	1.78	1.78
1.	1.77	1.74	1.74	1.77	1.80	1.83	1.83	1.81	1.77	1.77	1.78	1.78
2.	1.77	1.74	1.74	1.77	1.80	1.82	1.82	1.81	1.77	1.77	1.78	1.79
3.	1.77	1.74	1.74	1.77	1.80	1.82	1.82	1.80	1.77	1.77	1.79	1.79
4.	1.78	1.74	1.74	1.77	1.80	1.82	1.82	1.80	1.77	1.77	1.79	1.79
5.	1.78	1.75	1.74	1.77	1.79	1.81	1.82	1.80	1.77	1.77	1.79	1.80
6.	1.78	1.75	1.74	1.77	1.79	1.81	1.81	1.80	1.77	1.78	1.80	1.80
7.	1.79	1.75	1.74	1.77	1.79	1.81	1.81	1.80	1.77	1.78	1.80	1.80
8.	1.79	1.75	1.74	1.76	1.79	1.81	1.81	1.80	1.77	1.78	1.80	1.81
9.	1.79	1.75	1.74	1.76	1.79	1.80	1.81	1.80	1.77	1.78	1.81	1.81
10.	1.80	1.76	1.74	1.76	1.78	1.80	1.81	1.80	1.77	1.79	1.81	1.82
11.	1.80	1.76	1.74	1.76	1.78	1.80	1.80	1.80	1.78	1.79	1.82	1.82
12.	1.81	1.76	1.74	1.76	1.78	1.80	1.80	1.80	1.78	1.79	1.82	1.83
13.	1.81	1.76	1.75	1.76	1.78	1.80	1.80	1.80	1.78	1.80	1.83	1.83
14.	1.81	1.77	1.75	1.76	1.78	1.80	1.80	1.80	1.78	1.80	1.83	1.84
15.	1.82	1.77	1.75	1.76	1.78	1.79	1.80	1.80	1.78	1.80	1.84	1.84
16.	1.82	1.77	1.75	1.77	1.78	1.79	1.80	1.80	1.78	1.81	1.84	1.85
17.	1.83	1.78	1.75	1.77	1.78	1.79	1.80	1.80	1.79	1.81	1.85	1.86
18.	1.84	1.78	1.76	1.77	1.78	1.79	1.80	1.80	1.79	1.81	1.85	1.86
19.	1.84	1.78	1.76	1.77	1.78	1.79	1.80	1.80	1.79	1.82	1.86	1.87
20.	1.85	1.79	1.76	1.77	1.78	1.79	1.80	1.80	1.79	1.82	1.87	1.88
21.	1.86	1.79	1.76	1.77	1.78	1.79	1.80	1.81	1.80	1.83	1.87	1.89
22.	1.86	1.80	1.77	1.77	1.78	1.79	1.80	1.81	1.80	1.83	1.88	1.90
23.	1.87	1.80	1.77	1.77	1.78	1.79	1.80	1.81	1.80	1.84	1.89	1.91
24.	1.88	1.81	1.77	1.77	1.78	1.79	1.80	1.81	1.81	1.84	1.90	1.92
25.	1.89	1.81	1.78	1.78	1.78	1.79	1.80	1.81	1.81	1.85	1.91	1.93
26.	1.90	1.82	1.78	1.78	1.78	1.79	1.80	1.82	1.81	1.86	1.92	1.94
27.	1.91	1.82	1.78	1.78	1.78	1.79	1.80	1.82	1.82	1.86	1.93	1.95
28.	1.92	1.83	1.79	1.78	1.78	1.79	1.80	1.82	1.82	1.87	1.94	1.96
29.	1.93	1.84	1.79	1.79	1.79	1.79	1.81	1.82	1.83	1.88	1.95	1.98
30.	1.94	1.84	1.79	1.79	1.79	1.80	1.81	1.83	1.83	1.89	1.96	1.99
31.	1.95	1.85	1.80	1.79	1.79	1.80	1.81	1.83	1.84	1.89	1.97	2.01
32.	1.96	1.86	1.80	1.79	1.79	1.80	1.81	1.83	1.84	1.90	1.99	2.02
33.	1.98	1.87	1.81	1.80	1.79	1.80	1.81	1.84	1.85	1.91	2.00	2.04
34.	1.99	1.87	1.81	1.80	1.80	1.80	1.82	1.84	1.85	1.92	2.02	2.06
35.	2.01	1.88	1.82	1.80	1.80	1.80	1.82	1.84	1.86	1.93	2.03	2.08
36.	2.02	1.89	1.83	1.81	1.80	1.81	1.82	1.85	1.87	1.94	2.05	2.10
37.	2.04	1.90	1.83	1.81	1.80	1.81	1.83	1.85	1.87	1.95	2.07	2.12
38.	2.06	1.91	1.84	1.82	1.81	1.81	1.83	1.86	1.88	1.97	2.09	2.15
39.	2.08	1.92	1.84	1.82	1.81	1.82	1.83	1.86	1.89	1.98	2.11	2.18
40.	2.10	1.94	1.85	1.83	1.81	1.82	1.84	1.87	1.90	1.99	2.14	2.21
41.	2.13	1.95	1.86	1.83	1.82	1.82	1.84	1.87	1.91	2.01	2.16	2.24
42.	2.15	1.96	1.87	1.84	1.82	1.83	1.84	1.88	1.92	2.02	2.19	2.28
43.	2.18	1.98	1.88	1.84	1.83	1.83	1.85	1.89	1.93	2.04	2.22	2.32
44.	2.21	1.99	1.89	1.85	1.83	1.83	1.85	1.89	1.94	2.06	2.26	2.36
45.	2.25	2.01	1.89	1.85	1.83	1.84	1.86	1.90	1.95	2.08	2.29	2.41
46.	2.29	2.03	1.90	1.86	1.84	1.84	1.86	1.91	1.96	2.10	2.34	2.47
47.	2.33	2.05	1.92	1.87	1.84	1.85	1.87	1.92	1.97	2.12	2.38	2.53
48.	2.37	2.07	1.93	1.88	1.85	1.85	1.87	1.92	1.98	2.14	2.43	2.60
49.	2.43	2.09	1.94	1.88	1.86	1.86	1.88	1.93	2.00	2.17	2.49	2.68
50.	2.48	2.11	1.95	1.89	1.86	1.86	1.89	1.94	2.01	2.20	2.55	2.78

Table 2-2b. The Value of the m Factor (BTU/ft<sup>2</sup>)

LAT. DEG.	MONTH											
	1	2	3	4	5	6	7	8	9	10	11	12
0.	561.	552.	551.	563.	573.	581.	581.	574.	561.	561.	565.	565.
1.	561.	552.	551.	562.	572.	580.	580.	574.	561.	561.	566.	566.
2.	562.	553.	551.	562.	571.	579.	579.	573.	561.	562.	566.	567.
3.	563.	553.	551.	561.	571.	578.	578.	573.	561.	562.	567.	568.
4.	564.	554.	551.	561.	570.	577.	577.	572.	561.	563.	568.	569.
5.	565.	554.	552.	561.	569.	576.	576.	572.	562.	563.	569.	570.
6.	566.	555.	552.	560.	568.	575.	575.	572.	562.	564.	570.	571.
7.	567.	555.	552.	560.	568.	574.	575.	571.	562.	565.	571.	573.
8.	568.	556.	552.	560.	567.	573.	574.	571.	562.	565.	572.	574.
9.	569.	557.	553.	560.	567.	573.	573.	571.	563.	566.	574.	575.
10.	570.	558.	553.	560.	566.	572.	573.	571.	563.	567.	575.	577.
11.	572.	558.	553.	560.	566.	571.	573.	571.	563.	568.	576.	578.
12.	573.	559.	554.	560.	565.	571.	572.	571.	564.	569.	578.	580.
13.	574.	560.	554.	560.	565.	570.	572.	571.	564.	570.	579.	582.
14.	576.	561.	555.	560.	565.	570.	572.	571.	565.	571.	581.	584.
15.	577.	562.	555.	560.	565.	570.	571.	571.	566.	572.	583.	585.
16.	579.	563.	556.	560.	565.	569.	571.	571.	566.	573.	584.	587.
17.	581.	564.	557.	560.	564.	569.	571.	572.	567.	574.	586.	590.
18.	583.	565.	557.	561.	564.	569.	571.	572.	568.	576.	588.	592.
19.	585.	566.	558.	561.	564.	569.	571.	572.	569.	577.	590.	594.
20.	587.	568.	559.	561.	564.	568.	571.	573.	569.	579.	592.	597.
21.	589.	569.	560.	562.	564.	568.	571.	573.	570.	580.	595.	599.
22.	591.	570.	560.	562.	565.	568.	571.	574.	571.	582.	597.	602.
23.	594.	572.	561.	563.	565.	568.	571.	574.	572.	583.	600.	605.
24.	596.	574.	562.	563.	565.	568.	571.	575.	574.	585.	602.	608.
25.	599.	575.	563.	564.	565.	569.	572.	575.	575.	587.	605.	612.
26.	602.	577.	564.	565.	565.	569.	572.	576.	576.	589.	608.	615.
27.	605.	579.	566.	565.	566.	569.	572.	577.	577.	591.	612.	619.
28.	608.	581.	567.	566.	566.	569.	573.	578.	579.	594.	615.	623.
29.	611.	583.	568.	567.	567.	570.	573.	579.	580.	596.	619.	627.
30.	615.	585.	569.	568.	567.	570.	574.	580.	582.	598.	622.	631.
31.	619.	587.	571.	568.	568.	570.	574.	581.	583.	601.	627.	636.
32.	623.	590.	572.	569.	568.	571.	575.	582.	585.	604.	631.	641.
33.	627.	592.	574.	570.	569.	572.	576.	583.	587.	607.	635.	647.
34.	632.	595.	576.	572.	570.	572.	577.	584.	589.	610.	640.	653.
35.	637.	598.	577.	573.	571.	573.	577.	585.	591.	613.	646.	659.
36.	642.	601.	579.	574.	571.	574.	578.	587.	593.	617.	651.	666.
37.	648.	604.	581.	575.	572.	574.	579.	588.	595.	620.	657.	674.
38.	654.	607.	583.	577.	573.	575.	580.	590.	597.	624.	664.	682.
39.	660.	611.	586.	578.	574.	576.	581.	591.	600.	628.	671.	691.
40.	668.	615.	588.	580.	575.	577.	582.	593.	602.	633.	679.	700.
41.	675.	619.	590.	581.	577.	578.	584.	595.	605.	637.	687.	711.
42.	684.	623.	593.	583.	578.	579.	585.	597.	608.	642.	696.	722.
43.	693.	628.	595.	585.	579.	580.	586.	599.	611.	648.	706.	735.
44.	703.	633.	598.	587.	581.	582.	588.	601.	614.	653.	716.	749.
45.	714.	638.	601.	589.	582.	583.	589.	603.	618.	659.	728.	765.
46.	726.	643.	604.	591.	584.	585.	591.	605.	621.	666.	741.	783.
47.	739.	649.	608.	593.	585.	586.	593.	608.	625.	673.	755.	802.
48.	754.	656.	611.	595.	587.	588.	595.	611.	629.	680.	771.	825.
49.	770.	663.	615.	598.	589.	589.	597.	613.	634.	689.	789.	851.
50.	788.	671.	619.	600.	591.	591.	599.	616.	638.	698.	809.	881.

The azimuth angle,  $\alpha$ , is measured clockwise by a north-facing observer

$$\text{where } \alpha = \begin{cases} 0^\circ & \text{for north orientation,} \\ 90^\circ & \text{for east orientation,} \\ 180^\circ & \text{for south orientation, etc.} \end{cases}$$

and  $\tau$  = the array surface tilt angle from the horizontal.

Note that for a south-facing surface at any tilt angle

$$\cos \theta_t = \sin (\phi - \tau) \times \sin \delta + \cos (\phi - \tau) \times \cos \delta \times \cos \omega$$

#### Step 6

The average hourly terrestrial direct radiation on a horizontal surface is given by:

$$\bar{I}_{Dh} = \bar{I}_{DN} \times \cos \theta_t \text{ (with } \tau = 0 \text{)}$$

#### Step 7

The average hourly terrestrial total radiation on a horizontal surface is given by the sum of the hourly direct and diffuse components:

$$\bar{I}_{Th} = \bar{I}_{Dh} + \bar{I}_{dh}$$

#### Step 8

The average hourly terrestrial direct radiation on a tilted surface is given by:

$$\bar{I}_{Dt} = \bar{I}_{DN} \times \cos \theta_t \text{ (with } \tau = \text{given array tilt angle)}$$

#### Step 9

The average hourly terrestrial diffuse radiation on a tilted surface is given by:

$$\bar{I}_{dt} = \frac{1 + \cos \tau}{2} \times \bar{I}_{dh}$$

#### Step 10

Since the array is tilted up at some angle,  $\tau$ , it receives reflected radiation from the surrounding area that it faces. This reflected radiation will vary depending on whether there is high reflectivity (e.g., snow) or low reflectivity (e.g., forest). Tables 2-3 and 2-4 show average reflectivities for various surroundings. Hunn and Calafell (Reference 13) have developed a method for ascertaining these average reflectivities. They conclude:

Table 2-3. Reflectivity Values for 15 Characteristic Surfaces  
(Integrated Over Solar Spectrum and Angle of Incidence)  
(Reference 13)

Surface	Average Reflectivity
1. Snow (freshly fallen or with ice film)	0.75
2. Water surfaces (relatively large incidence angles)	0.07
3. Soils (clay, loam, etc.)	0.14
4. Earth roads	0.04
5. Coniferous forest (winter)	0.07
6. Forests in autumn, ripe field crops, plants	0.26
7. Weathered blacktop	0.10
8. Weathered concrete	0.22
9. Dead leaves	0.30
10. Dry grass	0.20
11. Green grass	0.26
12. Bituminous and gravel roof	0.13
13. Crushed rock surface	0.20
14. Building surfaces, dark (red brick, dark paints, etc.)	0.27
15. Building surfaces, light (light brick, light paints, etc.)	0.60

**Table 2-4. Average Reflectivity Values for 12 Representative Winter Landscapes (Reference 13)**

Surface Description	Average Reflectivity
<b>Rural Areas</b>	
Fields with Snow Cover	
1. Field with wooded area in background	0.66,0.73
2. Open field (soil and dry grass) near road	0.61,0.70
3. Trees dispersed in field	0.62
Wooded Areas	
4. Conifer forest (with heavy snow cover)	0.61
5. Deciduous forest (with heavy snow cover)	0.72
Water	
6. Open water	0.16
7. Ice/snow-covered water	0.68
8. Partially open waterway (trees and houses in background)	0.43,0.66
<b>Urban Areas</b>	
9. Urban areas (commercial, institutional)	0.16,0.38
10. Residential areas (dwellings and roadway)	0.21,0.35,0.45
11. Educational institution	0.36,0.42
12. Recreational area (park)	0.49

- (1) An average ground reflectivity of 0.6 to 0.7, similar to that used by Liu and Jordan (Reference 14), is accurate for most rural landscapes in winter and where snow cover is predominant. The exception to this is for locations adjacent to open, or partially open, bodies of water, where a considerably lower value of reflectivity is obtained.
- (2) For urban areas, no characteristic ground reflectivity for winter may be specified due to the wide variation in landscape details possible. However, the range for ground reflectivity for urban areas in winter is 0.16 to 0.49, considerably lower than that used by Liu and Jordan.
- (3) For all landscapes considered, ground reflectivities are quite sensitive to the fraction of field of view in snow cover.

Thus, the ground reflectivity is an input parameter denoted here by  $\rho$ .

The average hourly terrestrial reflected radiation from the ground is given by:

$$\bar{I}_{rt} = \frac{1 - \cos \tau}{2} \times \rho \times \bar{I}_{Th}$$

where  $\rho$  is the average ground reflectance.

#### Step 11

The final step is the calculation of the average hourly terrestrial total radiation on a tilted surface. This total is the sum of the direct, diffuse, and reflected components calculated in Steps 8-10.

$$\bar{I}_{Tt} = \bar{I}_{Dt} + \bar{I}_{dt} + \bar{I}_{rt}$$

Since the model divides daily values into hourly intensities (kilowatts per square meter), the intensity over one hour can be integrated to get kilowatt-hours per square meter (if it is assumed intensity is relatively constant over the hour). So at this point, the units of  $\bar{I}_{Tt}$  are kilowatts during hour  $\omega$  per square meter.

#### D. SPECTRAL CONSIDERATIONS

As mentioned earlier, the spectral response of solar cells is limited in comparison to the spectrum of light. The standard curve for the spectral distribution of light was in part established by the JPL Mariner Mars probe (References 15 and 16) and is illustrated in Figure 2-2. The area under this standard curve represents the solar constant  $I_c$ , defined earlier. Since the establishment of this constant, an adjustment has been made due to Frolich (Reference 17) updating the constant to 1.377 kW/m<sup>2</sup>. This new value is used throughout this document. Superimposed on the same curve is the range of a typical solar cell relative response curve. As shown, the region that the solar cell responds to is smaller than the overall spectrum.



In fact, the extraterrestrial radiation available to a solar cell can be obtained by multiplying the cell spectral response curve by the standard curve of Figure 2-2 and calculating the area under the resulting curve.

In order to model the transmission of light through the atmosphere, a Rayleigh type equation (Reference 11) could be used to generate transmission coefficients for each wavelength. However, the difficulty in using a transmission equation is determining values of the atmospheric constants in the equations. Furthermore, data that represent profiles over time of these constants are not generally available.

Thus the use of a non-spectrum oriented model will over-estimate the actual radiation to which a solar cell will respond. However, since this model estimates available insolation, it is implicitly assumed that, in the case of photovoltaics, conversion efficiencies must account for this difference when calculating power output from available insolation.

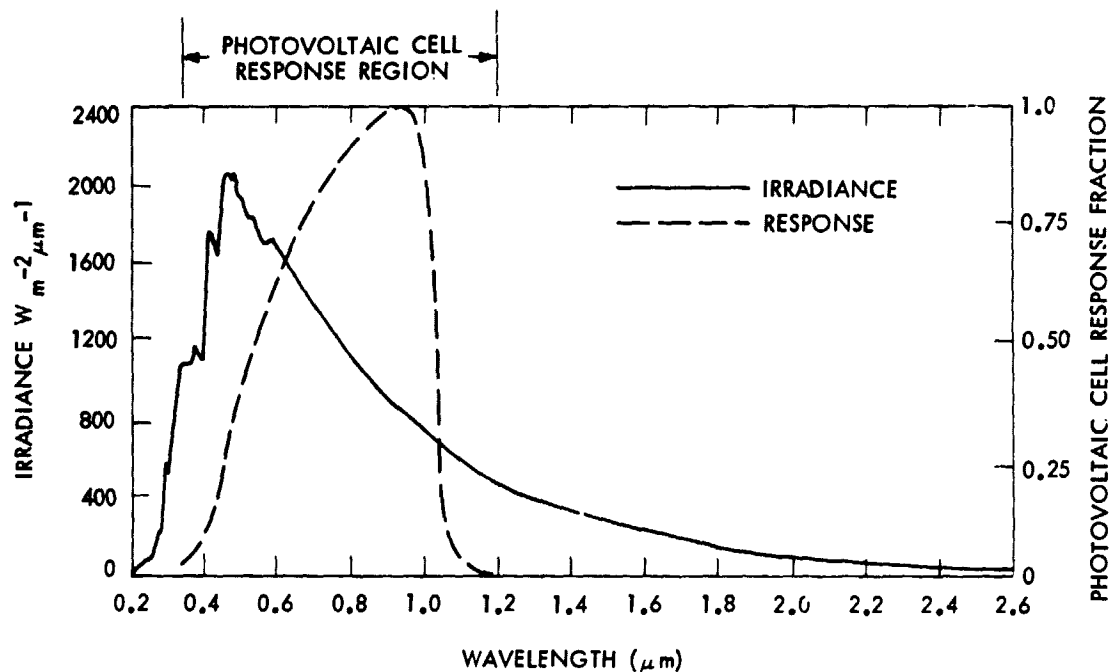


Figure 2-2. Solar Spectral Irradiance, Standard Curve, Solar Constant ( $1.377 \text{ kW/m}^2$ )

## SECTION III

### ARRAY SHADOWING

#### A. THE PROBLEM

The problem of array shadowing arises when arrays are placed too close together and the lower part of an array is caught in the shadow of the array in front of it. The model presented here is based on a model that assumes fixed flat-plate photovoltaic arrays facing south at some tilt angle (see Figure 3-1) and sufficiently close to cause shadowing at some point during the year (References 18 and 19).\* It is further assumed that the array length in the east-west direction is large relative to the array height and that cells within the arrays are connected in horizontal series strings so that shadowing does not cause an open circuit condition within modules.

The solar insolation loss caused by shadowing is the product of the available insolation to an unshadowed array times the fraction of the array in the shadow of the adjacent array to the south. So, available insolation energy loss is the time integral of the insolation intensity loss.

#### B. THE MODEL

To calculate the available insolation intensity (or energy) lost due to shadowing, the following parameters are required (see Figure 3-1): the length of the array surface, the array tilt angle, the sun elevation angle, and the array spacing.

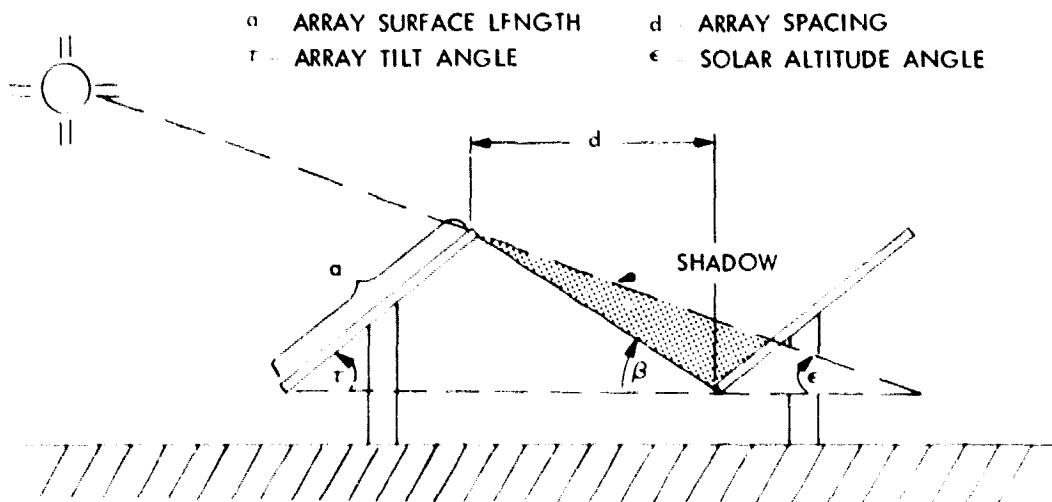


Figure 3-1. Shadow Problem Geometry

\*The front line of arrays will not receive any shadowing and must be considered separately.

For a given distance,  $d$ , between arrays, it can be shown that the fraction of available energy lost during hour  $\omega$  is given by:

$$F_s(\omega) = \begin{cases} 1 & \text{if } \epsilon \leq 0 \\ 1 - (\cos \tau + d/a) \frac{\sin \epsilon}{\sin(\epsilon + \tau)} & \text{if } 0 < \epsilon < \beta \text{ (Equation 3-1)} \\ 0 & \text{if } \epsilon \geq \beta \end{cases}$$

where  $F_s(\omega)$  = shadow loss fraction during hour angle  $\omega$

$\tau$  = array tilt angle (radians)

$d$  = array spacing (same units as  $a$ )

$a$  = array surface length (same units as  $d$ )

$\sin \epsilon$  = sine of sun elevation angle (a function of  $\omega$ )  
 $= \cos \phi \cos \delta \cos \omega + \sin \phi \sin \delta$  where  $\phi$ ,  $\omega$ , and  $\delta$   
are as defined in Section II (pages 2-4 and 2-8).

Since the above values are hourly, in order to calculate the energy losses over time, hourly power values (assuming the power during the hour is constant) can be summed using:

$$\begin{array}{l} \text{Available energy} \\ \text{lost due to} \\ \text{shadowing} \end{array} = \sum_{\omega = \text{sunrise}}^{\text{sunset}} \bar{I}_{Tt}(\omega) \times F_s(\omega)$$

since the power values from Section II are discrete.\* This sum represents a daily insolation estimate. To compute energy losses on a monthly or annual basis, the daily value must be multiplied by the number of days in the particular month and the sum taken over months in the year.

The program discussed in Section VI can be used to trade-off the energy losses due to shadowing with the total amount of space required for the system. The effects of shadowing become more pronounced in the higher latitudes so different spacings are required, depending on the economic parameters of the design.

It should be noted that this model is not restricted to the insolation model of Section II and recorded data could be used.

\*Similarly, if the available energy is to be calculated,  $(1 - F_s(\omega))$  must be substituted for  $F_s(\omega)$  in the above expression.

## SECTION IV

### REFLECTOR AUGMENTATION

#### A. THE PROBLEM

The question of reflector augmentation is concerned with a specific array design known as the tandem rack design (Reference 20). The geometry of this design is illustrated in Figure 4-1 and the derivation of the model for solar noon may be found in References 18 and 19. Again it is assumed that the arrays are south facing, but in this case, the north side of the array support structure is covered with a highly reflective surface (such as Mylar) facing the adjacent array. The insolation available to the array surface is determined by calculating an augmentation factor. This augmentation factor represents the additional insolation from the reflective surface.

This model is especially useful in conducting trade-offs among array spacing, tilt angles, and reflector angles.

#### B. THE MODEL

Examining Figure 4-1, it can be seen that when the sun elevation angle,  $\epsilon$ , is less than the reflector angle,  $\beta$ , there is no reflector augmentation, and in fact there are losses due to shadowing. In this case, the expression for hourly insolation is given by:

$$\bar{I}_{Tt}(\omega) \times (1 - F_s(\omega))$$

where  $\bar{I}_{Tt}(\omega)$  is the total insolation available to the surface during hour  $\omega$ , and  $F_s(\omega)$  is the shadow loss fraction during hour  $\omega$  (see Section III).

However, when the sun elevation angle is greater than the reflector tilt, reflection occurs. If the augmentation of array illumination by reflected sunlight is given by  $\Delta I/I$ , where  $\Delta I$  is the additional insolation and  $I$  is the available insolation without reflectors, the multiplier that yields the total insolation at the collector surface is given by  $1 + \Delta I/I$ .

For a specular reflectance,  $\rho'$ , the expression for the augmentation multiplier is given by:

$$1 + \Delta I/I = 1 + \rho' \times \sin(\epsilon - \beta) \times \frac{R - L}{a} \quad (\text{for } \beta \leq \epsilon \leq 2\beta)$$

where:  $\beta$  is the reflector tilt angle ( $= \tan^{-1} [a \times (\sin \tau)/d]$ );  $a$  is the array length in the meridian plane;  $R$  is the reflector length in the meridian plane; and  $L$  is the portion of the reflector length for which reflected insolation is not intercepted by the adjacent array for solar elevation angles greater than  $2\beta$ .

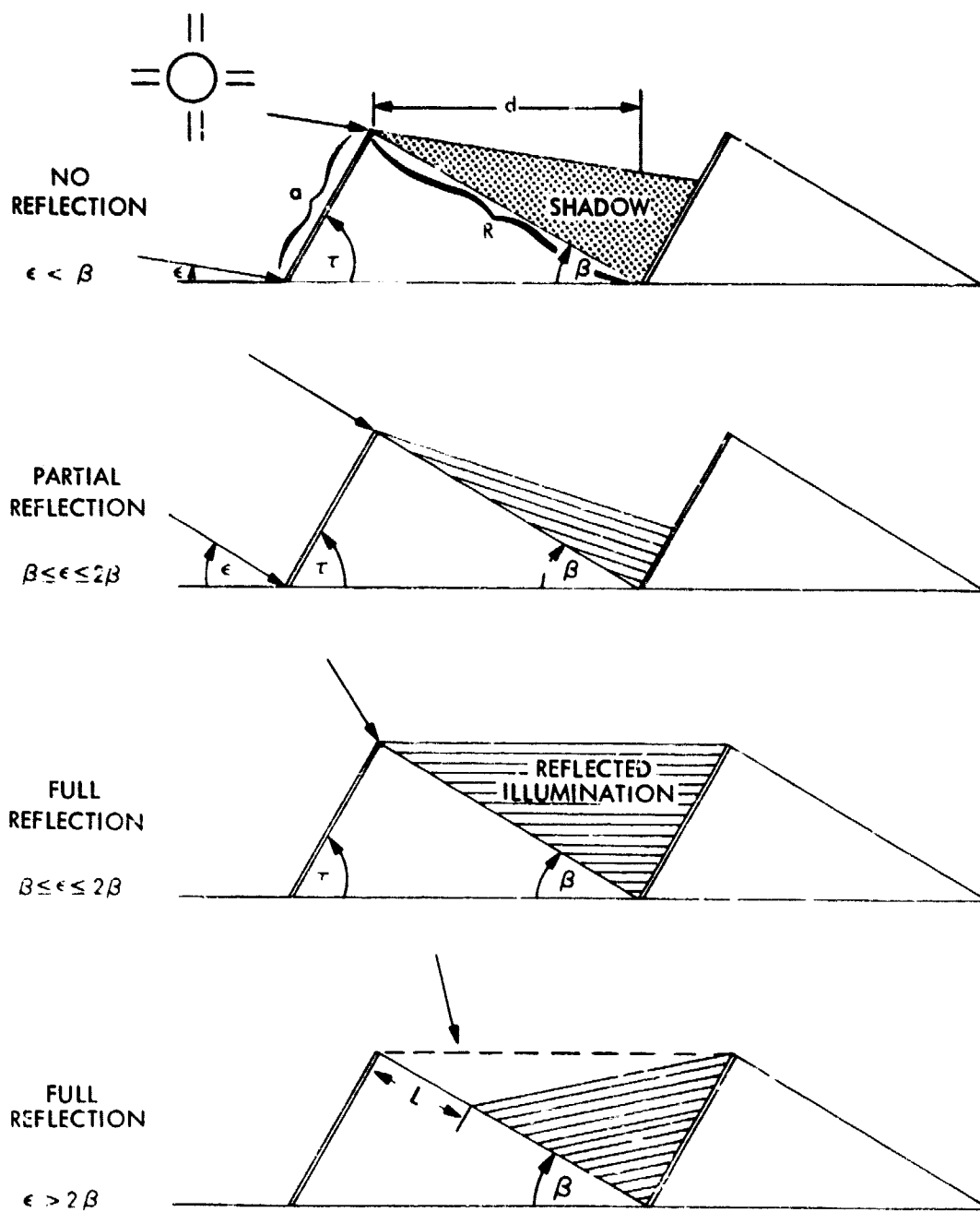


Figure 4-1. Reflector Augmentation Geometry

Since  $L = 0$  for  $\epsilon \leq 2\beta$ , a simpler form can be used for sun elevation angles less than twice the reflector inclination angle:

$$1 + \Delta I/I = 1 + \rho' \times \sin(\epsilon - \beta) \times \frac{\sin \tau}{\sin \beta} \quad \begin{array}{l} \text{(for } \beta \leq \epsilon \leq 2\beta) \\ \text{(Equation 4-1)} \end{array}$$

And for sun elevations greater than twice the reflector inclination, the multiplier is corrected for reflector losses by:

$$1 + \Delta I/I = 1 + \rho' \times \sin \tau \times \sin(\epsilon - \beta) \times \left[ \csc \beta - \frac{\cot \beta + \cot \tau}{\frac{\sin \beta}{\tan(\epsilon - 2\beta)} + \cos \beta} \right] \quad \begin{array}{l} \text{(for } \epsilon > 2\beta) \\ \text{(Equation 4-2)} \end{array}$$

So, for a given hourly insolation estimate from Section II or recorded data, multiplication by  $(1 + \Delta I/I)$  yields the total available plus reflected insolation on the array surface. That is,

$$\bar{I}(\omega) = \begin{cases} \bar{I}_{Tt}(\omega) \times (1 - (\text{Equation 3-1*})) & \text{if } \epsilon < \beta \\ \bar{I}_{Tt}(\omega) \times (\text{Equation 4-1}) & \text{if } \beta \leq \epsilon \leq 2\beta \\ \bar{I}_{Tt}(\omega) \times (\text{Equation 4-2}) & \text{if } \epsilon > 2\beta \end{cases}$$

Using the energy equation in Section III, this model can be used to determine the optimal spacing and reflector tilt to maximize energy output by multiplying the insolation level by either the shadow factor or the augmentation factor during hour  $\omega$ , depending on whether  $\epsilon$  is less than or greater than the reflector tilt,  $\beta$ . The computer program discussed in Section VI can be used to determine the optimal reflector angle and array separation distance for a particular site.

Again, recorded data may be used with this model if desired.

\*Equation 3-1 is on page 3-2.

## SECTION V

### DISCUSSION

A number of models have been presented that enable the solar array system engineer/designer to examine insolation parameters related to the system design. These models are concerned solely with the available insolation that can be expected for a particular location and array spacing, with or without reflecting surfaces. The estimates are average values intended for use in engineering applications. The advantages of the approach in this document are that sensitivity analyses can easily be performed and, given the appropriate cost function for array spacing, an optimal array spacing can be calculated.

#### A. INSOLATION MODEL SENSITIVITY

Certain limitations should be considered in using this model. The accuracy of the insolation model depends primarily on the  $\bar{K}_T$  values. If an hourly  $\bar{K}_T$  profile for a typical day were available, it would capture the shape of the profile more accurately. When  $\bar{K}_T$  values greater than 0.75 occur, the tabulated correlations between  $\bar{K}_T$  and  $\bar{K}_d$  in Section II can introduce extrapolation error. Sunny locations can yield  $\bar{K}_T$  values greater than 0.8, which requires extrapolation into the range where no correlated  $\bar{K}_d$  values exist. In the model and program presented here, extrapolation is limited to the upper bound of  $\bar{K}_T = 0.80$ .

In applications where load matching within the day is important, the insolation model presented here may be deficient. (Again, this depends on the randomness of the solar climate for the location.) Climates with highly variable cloud patterns will cause additional error; however, since the  $\bar{K}_T$  values are derived from monthly average values, daily and monthly totals should be reliable.

A sensitivity analysis was conducted in order to determine the effect of changes in the solar climate parameter  $\bar{K}_T$  on the total insolation  $\bar{I}_{Tt}$ . It was found that for a horizontal surface, there is essentially a one-to-one correspondence between percentage changes in  $\bar{K}_T$  and the resulting changes in  $\bar{I}_{Tt}$ . However, as the array is tilted upward, the  $\bar{K}_T$  value is more sensitive in winter months and less sensitive in the summer months; that is, the  $\bar{K}_T$  parameter sensitivity depends on the relationship between the orientation of the array surface and the sun elevation angle. In the higher north latitudes, the magnitudes of the sensitivities increase due to the more dramatic effects of changes in the declination and sun elevation angles.

#### B. INSOLATION MODEL VERIFICATION

A weakness of the current model is the difficulty in evaluating its accuracy. With errors in data collection, comparisons are difficult to evaluate. The lack of detailed hourly insolation data for various tilt

angles at numerous sites is a further problem. Some work has been done in Reference 12 (pages 263-265); however, since clear-day profiles were used, this error analysis has limited applicability.

Comparing the insolation model to three months of data collected at JPL (for a south-facing surface inclined at 15 degrees) yielded daily total estimates within 3% of the data values. These results are limited by the short record, but, as mentioned earlier, the model takes the daily amount of radiation and distributes it in a symmetric fashion about solar noon, thus introducing variation at the hourly level. The sum of the hourly absolute deviations of the model estimates from the data was much larger (6% to 8%); therefore, this model is to be used cautiously for applications where the profile within the day is important since it does not capture hourly trends. However, uncertainty about the trends in hourly data may exceed the error in using the model, depending on the micro-climate of the location. Improvement could be achieved using hourly  $\bar{K}_T$  values if the data were available.

The primary source of error is the data (total radiation on a horizontal surface) used to estimate the  $\bar{K}_T$  parameters and which limit the accuracy of the model. Since the recorded data may have measurement inaccuracies, these errors translate into model inaccuracy. Because of this, small differences cannot be considered very significant (Reference 21). Similarly, the extrapolation of this model to a site without recorded data must be done cautiously, since the model does not consider solar energy availability variations on a micro-climate scale and local topography might create local differences in solar insolation patterns.

Two components are influenced by the sunrise hour and array orientation. As can be seen from the definition of  $\cos \theta_t$  in Section II, the direct normal component is defined to be zero when the sun is behind the array. Thus, this component is unaffected. However, the diffuse and reflected components depend on the sunrise hour angle via the  $r_d$  term. Since the diffuse and reflected components are small during the sunrise/sunset hours, the error introduced by using the horizontal surface sunrise angle is not believed to be significant. However, the effect of spectrum changes on morning and afternoon insolation values may complicate this problem. The actual sunrise time that the surface "sees" may be calculated by setting the expression for  $\cos \theta_t$  equal to zero and solving iteratively for  $\omega = \omega_s$ . The author knows of no detailed study of the errors introduced by non-south-facing tilted surfaces. Thus, the user of the SOLINS subroutine provided with this document should be aware of the above problems with non-south-facing tilted arrays.

Finally, it should be noted that the model produces estimates of total available insolation and that photovoltaic cells respond only to certain wavelengths of the spectrum -- a spectrum that changes during the day. Thus, actual available insolation will be less for solar cells since they respond only to a certain region of the spectrum (see Section II-D above). This problem is in a sense a conversion efficiency problem specific to the technology of photovoltaic conversion and was not addressed in this document.



### C. SHADOW AND REFLECTOR MODELS

The shadow loss and reflector augmentation models provide estimates of the insolation energy losses and gains associated with these problems. Obviously, there are a number of shortcomings. The accuracy of these models depends directly on the accuracy of the insolation data input. The assumption that there is a one-to-one relationship between shadowing and insolation losses may be an optimistic estimate in the case where partial shadowing severely reduces module output. Another drawback of this model is that it is limited to rectangular-shaped collectors -- non-uniform shadowing is not considered. The reflector augmentation model shares this problem. In addition, there may be double counting of reflected insolation in areas of low ground reflectance. The specular and ground reflectance must be chosen carefully; e.g., if there are no reflective objects (mountains, trees, etc.) facing the arrays, it may be sufficient to set the ground reflectance to zero and adjust the specular reflectance. This is an area requiring further examination.

The remainder of this document presents a SOLINS computer program user's guide; a listing of SOLINS and related computer programs; and insolation profile data for 235 sites in the United States for various south-facing tilt angles. The computer program also computes shadow losses and reflector augmentation estimates on a monthly and annual basis. The values computed were verified by sampling 3% of the sites and reproducing all of the calculations using an APL computer program first and then by hand calculation.

## SECTION VI

### SOLINS COMPUTER PROGRAM USER'S GUIDE

The model presented here and the resulting computer program (called SOLINS) listed in Appendix A were written to support work being performed for the Low-Cost Solar Array Project at the Jet Propulsion Laboratory. In addition to calculating hourly and daily insolation estimates by month, the program calculates monthly and annual total available energy with array shadowing and/or reflector augmentation (that is, a reflecting surface facing the array surface). A copy of the program is available from the Computer Software Management and Information Center (COSMIC) operated for NASA by the Information Services Division of the University of Georgia Computer Center (Reference 22).

Eight subprograms are contained in the SOLINS package. In addition, the user must provide a main program that will call SOLINS. Appendix A illustrates a sample main program and each of the eight subprograms. The example main program runs each of three options available with SOLINS and the resulting outputs are shown in Appendix A. Also included in Appendix A is the program that generated the m factor tables in Section II.

#### A. SUBPROGRAM INS

The program is based upon a modified version of the National Bureau of Standards model (see Section II) and calculates the direct, diffuse, and reflected components of total insolation on a tilted surface with a given azimuthal orientation (south facing, east facing, etc.). The subroutine that produces these estimates (called INS) generates a monthly, average day profile by hour of the insolation energy. The model uses a parameter that captures the monthly solar climate, so the estimates include clouding factors and other weather patterns -- they are not clear day estimates. The user of the program specifies the latitude of the site, the array tilt, the azimuth, the month, the solar climate parameter, the ground reflectance, and the printout specification.

#### B. SUBPROGRAMS SHADOW AND REFL

In order to generate the shadowing and reflector estimates, the user must also specify the array spacing, the array surface length, and the spectral reflectance. Given the user's design data, the information required to run the program is the site latitude and solar climate parameter. This will be discussed in further detail later in this Section.

### C. COMPUTER CONFIGURATION REQUIRED -- MEMORY AND TIMING

The program was written in FORTRAN IV using the IBM 370/3032 at the California Institute of Technology. The program was designed to run in a batch mode and requires a maximum of 128 kilobytes of storage. The execution time is between 3 and 20 CPU seconds, depending on the specific user requirements.

### D. ACCURACY OF RESULTS

Due to the uncertainties associated with insolation data (see Section V, page 5-2), all calculations are performed in single precision. Thus, output tables have accuracy no greater than three significant figures. The program output was verified by hand calculation of a sampling of sites.

### E. CONTROL CARD REQUIREMENTS

The deck setup shown in Figure 6-1 is required to run the program. First are the control cards, which consist of a job card with accounting information specific to the site installation and compiler instructions (cards for an IBM installation are given in Figure 6-1) which are instructions to the operating system. Next, the main program and the SOLINS package are followed by a control card (installation specific) and then any data that are to be read in by the main program. At the end of the deck is a card that indicates the end of the job. This card is also installation specific. The program given here has no data included with it.

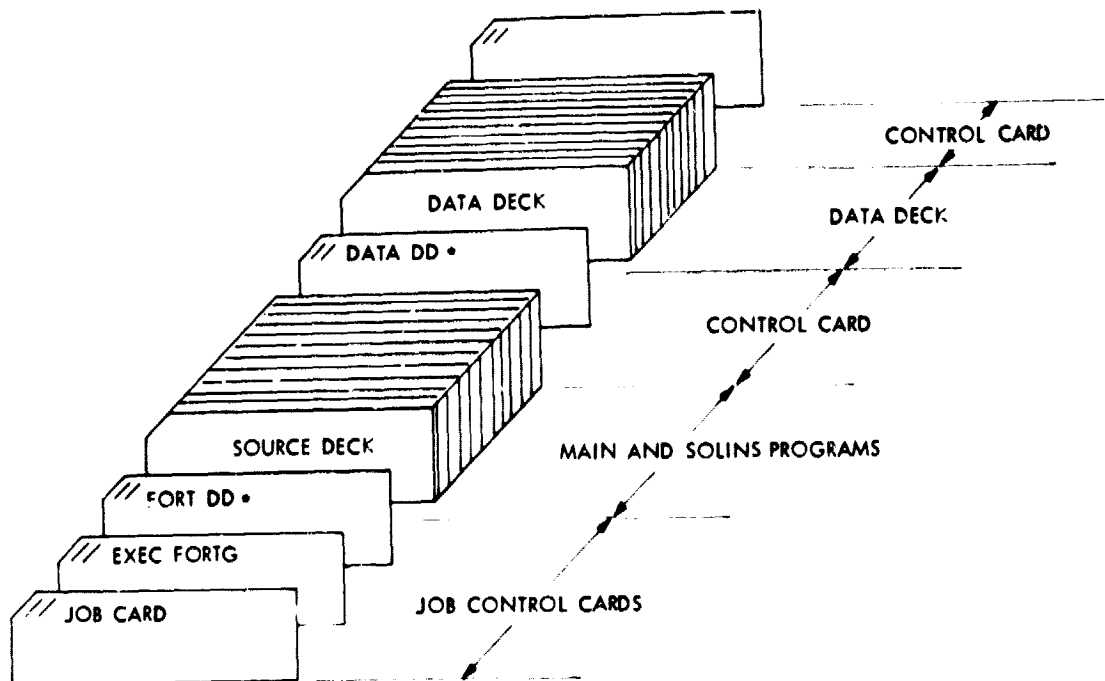


Figure 6-1. SOLINS Deck Setup

## F. USER INSTRUCTIONS

The user has three options available with the solar insolation program package (SOLINS):

- Option 1 -- Calculate the insolation tables only. That is, for one or all months, calculate the average hourly and daily insolation for a tilted surface at a given azimuthal orientation.
- Option 2 -- Calculate the insolation at five different array spacings (one tilt angle only) and on a monthly or annual basis. The unobstructed insolation is also calculated and a fraction of total monthly and annual energy lost due to shadowing is computed.
- Option 3 -- Calculate the reflector augmentation at a particular array spacing (one tilt angle only) and the fraction energy gain, by month or annually.

Each of these options has a distinct set of requirements and a general set of input rules that apply to all three.

The general input data requirements are that the variables ZKT (the 12 solar climate values), XLAT (the latitude), TOWN (the location), and RHO (the ground reflectance) must be specified when SOLINS is called. XLAT is represented in the form degrees and minutes (e.g., 32.51 is equivalent to 32° 51').

In addition to the general input data requirements, the parameters of the subroutine call must be specified. The CALL statement is of the following form:

CALL SOLINS (ISWTC, MONTH, IPRINT)

where ISWTC = 1 represents Option 1  
              = 2 represents Option 2  
              = 3 represents Option 3

MONTH = The calendar month (1-12) to be run or, if equal to 0, all 12 months are run automatically. This enables the user to change the parameters on a monthly basis to account for monthly or seasonal adjustment of the array tilt angle or monthly variation in ground reflectance to account for snow cover.

IPRINT = 0 prints nothing but returns all daily values in the following variables:

SUM(I) -- daily total (unobstructed) insolation at tilt angle I ( $\leq 9$ ).

SUMS(I,J) -- daily total with shadowing (at array spacing J) and one (I) tilt angle.

- SUMRE(1) -- daily total with reflector augmentation at one (1) tilt angle.
- = 1 prints the hourly and daily tables only;
  - = 2 prints only the shadow subrouting results;
  - = 3 prints the hourly and daily tables associated with the INS subroutine (which is called by SHADOW) as well as the output from SHADOW;
  - = 4 prints the results of subroutine REFL only;
  - = 5 prints the hourly and daily tables associated with the INS subroutine (which is called by REFL) as well as the output results from REFL.

The tabulated output is in kilowatt-hours per square meter. If other units are desired, the user must redefine the variable RST in the INS subroutine from  $1.377 \text{ kW/m}^2$  to the equivalent value in the new units (e.g.,  $437 \text{ BTU/(hr-ft}^2\text{)}$ ). Therefore, depending on the needs of the user, a variety of outputs are possible.

To aid the user, an optional subroutine DATCK (ISWTCH) has been included. This subprogram should be called prior to calling SOLINS and it will perform a cursory examination of the input data by checking ranges of values. It should be noted that DATCK does not have to be run for SOLINS to work; in fact, it may be removed from the package if desired.

The only program restriction is that the calling program to SOLINS must contain the following labeled common statement:

```
COMMON/SOL/ZKT(12), XLAT, RHO, TOWN(5), TILT(9), NO, NA, X(5),
IUNIT, SREFL, BETA, ALNGTH, SUM(9), SUM(9,5), SUMRE(9),
ZIT(24,9), SHD(24,1,5), REF(24,1)
```

where these variable names are reserved for use by SOLINS. In addition, the output unit must be specified using the integer variable IUNIT. This concludes the general requirements of the SOLINS package.

#### Option 1

The Option 1 (ISWTCH = 1) of the SOLINS subprogram computes the hourly and daily insolation estimates by calling the INS subprogram. The requirements for using this option are:

1. Up to but not more than nine tilt angles may be run at one time. The tilt angles (in decimal degrees) are stored in TILT(I) and a zero tilt angle may be used.
2. The number of tilt angles must be specified with the integer variable NA ( $\leq 9$ ).

3. The azimuthal orientation must be specified with the integer variable NO ( $1 \leq NO \leq 9$ ), where

1 = South	6 = Northeast
2 = Southwest	7 = East
3 = West	8 = Southeast
4 = Northwest	9 = Horizontal
5 = North	

If the user requires an azimuthal orientation angle somewhere between the above choices, the variable WAZ would have to be redefined with that angle ( $0^\circ$  = north, azimuth measured clockwise).

4. The ground reflectance must be specified using the real variable RHO (a value of 0.2 is typically used).
5. The general input requirements must be satisfied.

#### Option 2

The Option 2 (ISWTCH = 2) of the SOLINS subprogram computes the monthly total insolation estimates including shadowing by calling the subprogram, SHADOW, which in turn calls the INS subprogram. If the MONTH parameter is set equal to zero, the annual totals are also computed. The requirements for using this option are:

1. All of the Option 1 restrictions must be satisfied except the number of tilt angles, NA, must equal one.
2. The real variable ALNGTH, the array surface length (same units as X(\*)), must be specified (see Figure 3-1).
3. The real vector X(\*) of five array spacing values must be specified (same units as ALNGTH).
4. The azimuthal orientation must be south facing (NO = 1).
5. The tilt angle should not equal zero (redundant to purpose of Option 2).

#### Option 3

The Option 3 (ISWTCH = 3) of the SOLINS subprogram computes the total insolation estimates including shadowing and reflector augmentation by calling the subprogram REFL, which in turn calls the INS subprogram. If MONTH = 0, the annual totals are also computed. The requirements for using this option are:

1. All the Option 2 restrictions must be satisfied -- except the array spacing value must be stored in X(1) (array spacing is not allowed to vary within a single call to REFL).

2. The real variable SREFL must contain the spectral reflectance value of the reflective surface. If no reflective surface is present, SREFL = 0.0.

A sample main program with the corresponding output may be found in Appendix A. While this program package does not allow for every possible user need, a listing of the programs is presented in Appendix A to enable the user to adapt the program to individual requirements.

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## APPENDIX A

### LISTING OF SOLINS AND RELATED COMPUTER PROGRAMS

An example main program is given followed by the SOLINS, DATCK, SHADOW, REFL, and INS subroutines. Subroutine INS is followed by its FUNCTION subprograms, ZD, SHDLOS, and AUG. The sample main program runs each of the SOLINS three options.

The first option call in the main program generates the monthly tables of insolation values (kilowatt-hours/square meter) as shown on pages A-23 through A-26.

The second option call in the main program generates the monthly insolation estimates and annual totals with and without array shadowing for five array spacings. In addition, the fraction of energy lost due to shadowing is printed (page A-27). The monthly losses are computed by multiplying the daily amounts (with and without shadowing) by the number of days in the given month and computing a percentage loss.

The third option call of the main program makes several passes through the reflector augmentation subroutine while varying the array spacing (pages A-28 through A-30). It can be seen that a maximum occurs at a spacing of 7 meters; however, a more detailed search (finer increments) would be required to determine the global optimum. Again, the daily amounts (before multiplication by the number of days in the month) are printed.

Finally, the program used to generate Tables 2-2a and 2-2b on pages 2-10 and 2-11 is given on page A-31.

```

C
C SAMPLE MAIN PROGRAM
C
C THIS EXAMPLE RUNS THE INSOLATION PROGRAM INS, THE SHADOW PROGRAM, SHADOW,
C AND THE REFLECTOR AUGMENTATION PROGRAM REFL.
C
COMMON /SOL/ZKT(12),XLAT,RHO,TOWN(5),TILT(9),NO,NA,X(5),IUNIT,
1 SREFL,BETA,ALNGTH,SUM(9),SUMS(9,5),SUMRE(9),ZII(24,9),REF(24,1),
2 SHD(24,1,5)
C THE VARIABLE N RUNS OVER THE NUMBER OF SITES.
N=1
DO 1 K=1,N
C READ THE SITE LOCATION AND THE SOLAR CLIMATE VECTOR.
READ(5,2) (TOWN(I),I=1,5),XLAT
READ(5,4) (ZKT(L),L=1,12)
C SPECIFY THE NUMBER OF TILT ANGLES
NA=9
C SET THE TILT ANGLES.
TILT(1)=0.0
TILT(2)=10.0
TILT(3)=20.0
TILT(4)=25.0
TILT(5)=30.0
TILT(6)=35.0
TILT(7)=40.0
TILT(8)=50.0
TILT(9)=60.0
C SPECIFY THE AZIMUTHAL ORIENTATION.
NO=8
C SPECIFY THE OUTPUT UNIT
IUNIT=6
C PRINT SWITCH(SEE SUBROUTINE SOLINS).
IPRINT=1
C GROUND REFLECTANCE(MOUNTAINS, TREES, ETC. FACING THE ARRAY).
RHO=.2
C ISWTC DETERMINES WHICH OPTION IS TO BE RUN.
ISWTC=1
C SET THE MONTH TO BE RUN.
MONTH=0
C CALL THE SOLINS ROUTINE FOR OPTION ONE.
CALL SOLINS(ISWTC,MONTH,IPRINT)
35 CONTINUE
C SET OPTION TWO.
ISWTC=2
NO=1
C SPECIFY THE LENGTH OF THE ARRAY FROM THE GROUND EDGE ALONG THE SURFACE
C TO THE TOP EDGE(METERS).
ALNGTH=4.0
C SPECIFY THE VARIOUS ARRAY SPACINGS(METERS)--HORIZONTAL DISTANCE FROM TOP OF
C FRONT ARRAY TO BOTTOM OF REAR ARRAY.
X(1)=3.0
X(2)=4.0
X(3)=5.0
X(4)=6.0
X(5)=8.0
C NEW PRINT OPTION.

```

```

      IPRINT=2
C  RUN ALL THE MONTHS.
      MONTH=0
C  SET A NEW TILT ANGLE.
      TILT(1)=28.4
C  RESET THE NUMBER OF TILT ANGLES TO ONE.
      NA=1
C  CHECK THE DATA FOR OPTION TWO.
      CALL DATCK(ISWTCH)
C  CALL SOLINS TO RUN OPTION TWO.
      CALL SOLINS(ISWTCH,MONTH,IPRINT)
C  TURN SWITCH TO OPTION THREE--THE REFLECTOR AUGMENTATION PROBLEM.
      ISWTCH=3
C  SPECIFY THE SPECTRAL REFLECTANCE(IF REFLECTORS ARE PRESENT).
      SREFL=0.75
C  RUN THE ENTIRE YEAR.
      MONTH=0
C  RESET THE PRINT OPTION.
      IPRINT=4
C  RESET THE ARRAY SPACING.
      X(1)=3.
C  CHECK THE DATA FOR OPTION THREE.
      CALL DATCK(ISWTCH)
C  CALL SOLINS FIVE TIMES USING OPTION THREE.
      DO 5 J=1,5
      CALL SOLINS(ISWTCH,MONTH,IPRINT)
C  INCREMENT THE ARRAY SPACING.
      X(1)=X(1)+4.0
      5 CONTINUE
      1 CONTINUE
      2 FORMAT(5A4,F10.0)
      4 FORMAT(12F5.3)
      3 STOP
      END

```

SUBROUTINE SOLINS

CALIFORNIA INSTITUTE OF TECHNOLOGY

JET PROPULSION LABORATORY

4800 OAK GROVE DRIVE  
PASADENA, CALIFORNIA

JEFF H. SMITH

THIS PROGRAM WAS WRITTEN TO SUPPORT WORK CURRENTLY BEING PERFORMED FOR THE LOW COST SOLAR ARRAY PROJECT(LSA) AT JPL. FURTHER DETAIL MAY BE FOUND IN REFERENCE 1: SMITH, J.H., HANDBOOK OF SOLAR ENERGY DATA FOR SURFACES OF ARBITRARY ORIENTATION IN THE U.S. LSA DOCUMENT NUMBER 5101-91. JET PROPULSION LABORATORY; PASADENA, CALIFORNIA, JANUARY 1980.

SUBROUTINE SOLINS(ISWTCH,MONTH,IPRINT)

THE SOLINS SUBPROGRAM CONSISTS OF SIX SUBPROGRAMS AND CALLS THE APPROPRIATE OPTIONS AVAILABLE DEPENDING ON THE VALUE OF ISWTCH.

NOTE: PRIOR TO USING SOLINS, THE USER SHOULD CONSULT THE PROGRAM AND DATA REQUIREMENTS SECTION BELOW.  
END NOTE.

THE THREE OPTIONS ARE:

OPTION 1) ISWTCH=1: GENERATES HOURLY INSOLATION VALUES FOR UP TO 9 DIFFERENT TILT ANGLES AND ANY AZIMUTHAL ORIENTATION AND GROUND REFLECTANCE.

OPTION 2) ISWTCH=2: GENERATES MONTHLY TOTAL INSOLATION VALUES WITH AND WITHOUT SHADOWING FOR 5 DIFFERENT ARRAY SPACINGS AT ONE TILT ANGLE AND ORIENTATION PER MONTH. THIS OPTION ALSO CALCULATES THE TOTAL ANNUAL ENERGY WITH AND WITHOUT SHADOWING AND THE MONTHLY AND ANNUAL FRACTION OF ENERGY LOST AT EACH OF 5 ARRAY SPACINGS.

OPTION 3) ISWTCH=3: GENERATES THE MONTHLY ENERGY WITH REFLECTOR AUGMENTATION AND THE FRACTION OF ENERGY GAINED. THE SHADOW FACTOR IS ALSO INCLUDED IN THIS OPTION AND THE ARRAY SPACING MUST BE SPECIFIED.

THE MODELING APPROACH USED TO GENERATE THE INSOLATION TABLES IS DISCUSSED IN THE INS SUBROUTINE.



# PROGRAM REQUIREMENTS

THE PROGRAM DATCK DOES NOT HAVE TO BE RUN PRIOR TO CALLING SOLINS.  
THE MAIN PROGRAM MUST CONTAIN THE FOLLOWING COMMON STATEMENT:

```
COMMON /SOL/ZKT(12),XLAT,RHO,TOWN(5),TILT(9),NO,NA,X(5),IUNIT,
* SREFL,BETA,ALNGTH,SUM(9),SUMS(9,5),SUMRE(9),ZIT(24,9),REF(24,1),
* SHD(24,1,5)
```

CONTINUE

THE UNITS OF THE TABLES MAY BE CONVERTED BY REPLACING THE VARIABLE RST  
(THE SOLAR CONSTANT) WITH ITS EQUIVALENT VALUE IN THE DESIRED UNITS.  
RST APPEARS IN THE BEGINNING OF THE INS SUBROUTINE.

N O T E. THE VARIABLES USED IN THE COMMON STATEMENT ARE RESERVED FOR  
SOLINS AND ITS SUBROUTINES.  
THE ARRAY SUM(I) WILL CONTAIN THE DAILY TOTAL INSOLATION FOR ARRAY  
TILT ANGLE I FOR MONTH(NO SHADOWING OR REFLECTOR AUGMENTATION).  
THE ARRAY SUMS(I,J) WILL CONTAIN THE DAILY TOTAL INSOLATION  
(WITH SHADOWING) FOR ARRAY SPACING J AND ONE ARRAY TILT ANGLE FOR  
MONTH.  
THE VARIABLE SUMRE(1) WILL CONTAIN THE DAILY TOTAL INSOLATION WITH  
REFLECTOR AUGMENTATION AND SHADOWING FOR ONE ARRAY TILT ANGLE AND  
MONTH.  
E N D N O T E.

CONTINUE

## OPTION 1 REQUIREMENTS

UP TO BUT NOT MORE THAN 9 TILT ANGLES MAY BE RUN AT ONE TIME(STORED IN THE  
ARRAY NAMED TILT). A ZERO TILT ANGLE MAY BE USED.  
THE NUMBER OF ANGLES MUST BE SPECIFIED WITH THE INTEGER VARIABLE NA.  
THE AZIMUTHAL ORIENTATION MUST BE SPECIFIED WITH THE INTEGER VARIABLE NO:

WHERE	NO	=ORIENTATION NUMBER AND
		1=SOUTH
		2=SOUTHWEST
		3=WEST
		4=NORTHWEST
		5=NORTH
		6=NORTHEAST
		7=EAST
		8=SOUTHEAST
		9=HORIZ.

THE OUTPUT UNIT MUST BE SPECIFIED USING THE INTEGER VARIABLE IUNIT.  
THE GROUND REFLECTANCE MUST BE SPECIFIED USING THE REAL VARIABLE RHO.  
THE REAL VECTOR ZKT MUST BE SPECIFIED.  
THE TOWN VECTOR SHOULD BE SPECIFIED.  
THE LATITUDE XLAT MUST BE SPECIFIED.  
THE INTEGER VARIABLE MONTH MUST BE SPECIFIED:  
MONTH =DETERMINES WHETHER ALL 12  
MONTHLY TABLES ARE COMPUTED  
(=-1), OR ONLY ONE MONTHS  
TABLES ARE COMPUTED(E.G.  
MONTH=3 FOR MARCH).







```

C B-----B
C
C C-----C
C THE FOLLOWING DATA CHECKS ARE PERTINENT TO THE OPTION THREE CALLS.
  3 T=X(1)/ALNGTH
    BETA= ATAN(SIN(TILT(1)*3.14159/180.)/T)
    TB=BETA*180./3.14159
    IF(TB.LT.0..OR.TB.GT.90.) GO TO 800
    RETURN
C C-----C
C D-----D
C THE FOLLOWING ARE THE PRINT STATEMENTS FOR THE ABOVE CHECK PROCEDURES.
100 WRITE(IUNIT,101) (ZKT(I),I=1,12)
101 FORMAT(10X,'DATA ERROR IN ZKT',12F8.3)
    GO TO 10
200 WRITE(IUNIT,201) XLAT
201 FORMAT(10X,'DATA ERROR IN XLAT',F8.2)
    RETURN
300 WRITE(IUNIT,301) RHO
301 FORMAT(10X,'DATA ERROR IN RHO',F8.2)
    RETURN
400 WRITE(IUNIT,401) TILT(K)
401 FORMAT(10X,'DATA ERROR IN TILT VALUE',F5.2)
    GO TO 20
500 WRITE(IUNIT,501) NO
501 FORMAT(10X,'DATA ERROR IN NO',I4)
    RETURN
600 WRITE(IUNIT,601) NA
601 FORMAT(10X,'DATA ERROR IN NA',I4)
    RETURN
700 WRITE(IUNIT,701) X(I)
701 FORMAT(10X,'DATA ERROR IN X',F8.3)
    GO TO 30
800 WRITE(IUNIT,801) TB
801 FORMAT(10X,'DATA ERROR IN BETA',F8.3)
    GO TO 2
C D-----D
  END

```



```

C      CALL INS(ISWTCH,MONTH,IPRINT)
C
C      CALCULATE THE MONTHLY INSOLATION
      C=SUM(1)*LDAY(MONTH)
      DO 3 I=1,5
        3 S(I)=0.
C      CALCULATE THE ANNUAL INSOLATION THUS FAR(IF REQUIRED)
      DO 1 I=1,5
        S(I)=S(I)+SUMS(1,I)*LDAY(MONTH)
        SS(I)=S(I)+SS(I)
C      CALCULATE THE MONTHLY FRACTION OF ENERGY LOST DUE TO SHADOWING.
      1 FRACM(MONTH,I)=ABS(1.-S(I)/C)
      TOT=TOT+C
      IF(IPRINT.EQ.0) GO TO 33
C      OUTPUT THE MONTHLY RESULTS.
      WRITE(IUNIT,6)MONTH,TILT(1),(ORIENT(J,NO),J=1,3),RHO,SUM(1),
      1 (SUMS(1,K),K=1,5),(FRACM(MONTH,I),I=1,5)
      6 FORMAT(1X,I3,2X,F5.2,4X,3A4,3X,F4.2,15X,F4.2,15X,
      1 2(5F5.2,5X),/)
      33 CONTINUE
      IF(ISTOP.EQ.1) GO TO 29
      2 GO TO 25
      30 CONTINUE
      IF(ISTOP.EQ.1) GO TO 29
      DO 5 L=1,5
C      CALCULATE THE ANNUAL FRACTION OF ENERGY LOST.
      5 FRACY(L)=1-SS(L)/TOT
      IF(IPRINT.EQ.0) GO TO 29
C      OUTPUT THE ANNUAL RESULTS.
      WRITE(IUNIT,7) TOT,(SS(L),L=1,5),(FRACY(L),L=1,5)
      7 FORMAT(1X,I23('-'),/,30X,'ANNUAL AMOUNTS:',F10.2,10X,5F10.2,/,
      124X,'ANNUAL FRACTION LOST:',20X,5F10.2)
      29 RETURN
      END

```



```

50 CONTINUE
   IF(ISTOP.EQ.1) GO TO 13
   GO TO 25
30 CONTINUE
   IF(IPRINT.EQ.0) GO TO 13
   IF(MONTH.NE.0) GO TO 13
   ANF=TRE/TOT-1.0
   WRITE(IUNIT,62) TOT,TRE,ANF
62 FORMAT(1X,131('-').//,56X,'ANNUAL AMOUNTS: ',F10.2,15X,F10.2,15X,
1  F10.2)
13 RETURN
   END

```



```
C
C      DEFINE THE UNITS OF THE TABLES BY SPECIFYING THE SOLAR CONSTANT.  IN THIS
C      CASE KW/M**2 IS USED.
C
C      RST=1.377
C
C      DO LOOP 876 CONVERTS THE INPUT TILT ANGLES INTO RADIAN.
C          DO 876 LL=1,NA
C              TILD(LL)=TILT(LL)
C      876   TILT(LL)=TILT(LL)*PI/180.
C IF M=1, THE COMPONENT TABLES OF THE TOTALS ARE PRINTED.  IF M=0, THEY ARE NOT
M=0
C THE VARIABLE IUNIT DETERMINES WHICH OUTPUT UNIT THE OUTPUT
C WILL BE PRINTED ON.
C AZM CONTAINS THE CONVERTED VALUE(RADIANS) OF THE AZIMUTH
C ANGLE.
    AZM=WAZ(NO)*PI/180.
C THE FOLLOWING FOUR STATEMENTS CONVERT THE LATITUDE TO RAD-
C IANS.
    XLAX=AINT(XLAT)
    LAT=(XLAX+(XLAT-XLAX)/0.6)*PI/180.
    LAX=INT(XLAT)
    MINUTE=(XLAT-XLAX+.0001)*100
C CONSISTENCY CHECK.
    IF(NA.NE.1.AND.ISWTCH.GT.1) WRITE(IUNIT,345)
345 FORMAT(3X,'XXXXXXXXXX',10X,' THE NUMBER OF TILT ANGLES IS',
     1' GREATER THAN ONE SO MATRIX SHD MUST BE REDEFINED (24,NA,5)')
    30 FORMAT(// ,29X,' LOCATION ',5A4,' LATITUDE',I4,' DEGREES',
     1 I4,' MINUTES')
        N=MONTH
        IF(MONTH.LT.1) N=1
134   CONTINUE
        RD=AINT(XDEC(N))
C CONVERT THE DECLINATION TO RADIAN.
        DEC=(RD+(XDEC(N)-RD)/0.6)*PI/180.
C CALCULATE THE SUNRISE HOUR ANGLE.
        COSWS=(-SIN(LAT)/COS(LAT))*(SIN(DEC)/COS(DEC))
        IF(COSWS.GT.1..OR.COSWS.LT.-1) RETURN
        IF(IPRINT.EQ.0.OR.ISWTCH.GT.1) GO TO 133
        IF((N.EQ.1.OR.MONTH.GT.0).AND.(IPRINT.EQ.1.OR.IPRINT.EQ.3.OR.IPRIN
1T.EQ.5)) WRITE(IUNIT,41)
        IF((N.EQ.1.OR.MONTH.GT.0).AND.(IPRINT.EQ.1.OR.IPRINT.EQ.3.OR.IPRIN
1T.EQ.5)) WRITE(IUNIT,30) (TOWN(JJ),JJ=1,5),LAX,MINUTE
133 CONTINUE
        WS=ARCOS(COSWS)
        TWS=WS*12/PI
        SUNRIZ=12.-ABS(TWS)
        SUNSET=12.+ABS(TWS)
        COSLD=COS(LAT)*COS(DEC)
```



```

      SINLD=SIN(LAT)*SIN(DEC)
C  A-----A
      S=0.
C  DO LOOP 500 CALCULATES THE VALUE OF THE TOTAL DAILY DIRECT NORMAL
C  RADIATION.
      DO 500 L=1,39
      WW=WS*L/40.
      CZE=COSLD*COS(WW)+SINLD
      PAR=-B(N)/CZE
      APA=ABS(PAR)
      IF(APA.GT.80.) GO TO 501
      ANS=EXP(PAR)*CZE
      GO TO 502
501 ANS=0.
502 S=ANS+S
500 CONTINUE
C  A-----A
      ANSO=EXP(-B(N)/(COSLD+SINLD))*(COSLD+SINLD)/2.
      AI=WS/40.*(ANSO+S)
C  TAKE THE PROPORTION OF TOTAL DAILY RADIATION THAT REACHES THE EARTH AND
C  CALCULATE THE FRACTION THAT IS DIFFUSE RADIATION, KD.
C  THE ZKT VALUES REPRESENT THE MONTH-SPECIFIC AVERAGE DAILY FRACTION OF TOTAL
C  INSOLATION REACHING THE EARTH'S SURFACE AFTER PASSING THROUGH THE ATMOSPHERE.
      ZKD=ZD(ZKT(N))
C
C  CALCULATE THE EXTRATERRESTRIAL SOLAR RADIATION.
      HO=24./PI*R(N)*RST*(COSLD*SIN(WS)+WS*SINLD)
      PH=HO
C
      THH=HO*ZKT(N)
      DHH=HO*(ZKT(N)-ZKD)
C
C  CALCULATE THE MONTHLY AVERAGE DAILY DIFFUSE RADIATION ON A HORIZ-
C  ONTAL SURFACE.
      RHH=HO*ZKD
C
C  CALCULATE THE ABAR FACTOR.
      A=DHH/(24./PI*AI)
      FAC=A/ZKT(N)
C  DO LOOP 2 SETS THE ARRAYS WHICH WILL CONTAIN THE HOURLY VALUES
C  EQUAL TO ZERO.
C  B-----B
C  ZERO ARRAYS.
      DO 2 K=1,9
      DO 2 I=1,24
      DNI(I)=0.
      ASI(I,K)=0.
      RSI(I,K)=0.
      ZIT(I,K)=0.
C  B-----B
C
C  C-----C
C  DO LOOP 3 CALCULATES THE AVERAGE HOURLY SOLAR INSOLATION VALUES ON
C  A TILTED SURFACE.
      DO 3 I=1,24
      TIME=I-1.

```

```

      WT=ABS(12.-TIME)
      IF(TIME-SUNRIZ) 3,3,4
      4 IF(TIME-SUNSET) 5,3,3
      5 W=(TIME-12.)*PI/12.
      COSZ=SINLD+COSLD*COS(W)
      COSW=COS(DEC)*SIN(W)
      DO 10 K=1,NA
25    CONTINUE
C    COSTH IS THE ANGLE OF INCIDENCE BETWEEN THE SUNS DIRECT BEAM AND A
C    NORMAL TO THE ARRAY SURFACE.
C
      COSTH=(SIN(LAT)*COS(TILT(K))+COS(LAT)*SIN(TILT(K))*
1    COS(AZM))*SIN(DEC)+(COS(LAT)*COS(TILT(K))-SIN(LAT)*
1    SIN(TILT(K))*COS(AZM))*COS(DEC)*COS(W)-
1    SIN(TILT(K))*SIN(AZM)*COSW
C
      IF(COSTH.LT.1.0E-25) COSTH=0.0
C    RR CONVERTS THE DAILY TOTAL TO AN HOURLY VALUE(REFERENCE, STEP4).
      RR=PI/24.*(COS(W)-COS(WS))/(SIN(WS)-WS*COS(WS))
      IF(RR.LT.1.0E-25) RR=0.
C    CALCULATE THE AVERAGE HOURLY DIFFUSE RADIATION ON A HORIZONTAL
C    SURFACE.
      RHI=RHH*RR
      PAR2=-B(N)/COSZ
      AP3=ABS(PAR2)
      IF(AP3.GT.80) GO TO 3
      DNI(I)=A*EXP(PAR2)
      IF(DNI(I).LE.0.) DNI(I)=0.
      DHI=DNI(I)*COSZ
      IF(DHI.LE.0.) DHI=0.
C    IF ARRAY IS HORIZONTAL WE HAVE A SPECIAL CASE-GO TO D BLOCK
      IF(TILT(K).EQ.0.) GO TO 26
C    CALCULATE THE AVERAGE HOURLY TOTAL DIFFUSE RADIATION ON A TILTED SURFACE(NOT
C    REQUIRED FOR FINAL OUTPUT BUT MAY BE PRINTED BY SETTING M>1).
      RSI(I,K)=(RHI+ (RHI+DHI)*RHO)*(1.-COS(TILT(K)))/2.
      IF(TILT(K).EQ.0.) RSI(I,K)=RHI
      GO TO 444
C    D-----D
C    HORIZONTAL ARRAY CASE.
26    CONTINUE
C    CALCULATE THE AVERAGE HOURLY DIRECT RADIATION.
      ASI(I,K)=DNI(I)*COSTH
C    THE FOLLOWING CHECK IS FOR ANOMALOUS NEG. VALUES NEAR SUNRISE
C    AND SUNSET.
      IF(ASI(I,K).LE.0.) ASI(I,K)=0.
C    CALCULATE THE AVERAGE HOURLY DIFFUSE RADIATION ON A HORIZONTAL
C    SURFACE(REFERENCE 1 STEP 4).
      RSI(I,K)=(RHI+(RHI+DHI)*RHO)/2.
      IF(TILT(K).EQ.0.) RSI(I,K)=RHI
444    CONTINUE
C    D-----D
C
C    CALCULATE THE TOTAL AVERAGE HOURLY RADIATION ON A TILTED SURFACE.
      ZIT(I,K)=DNI(I)*COSTH+.5*((1.+COS(TILT(K)))*RHI+
1    RHO*(DHI+RHI)*(1.-COS(TILT(K))))
      IF(TILT(K).EQ.0. .OR.ISWTCH.EQ.1) GO TO 10

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```

C E-----E
C CALCULATE THE SHADOW CASE.
  DO 296 L=1,5
296 SHD(I,K,L)=ZIT(I,K)*SHDLOS(TILT(K),X(L),ALNGTH,COSZ)
C E-----E
C CALCULATE BETA, THE REFLECTOR TILT ANGLE
  BETA= ATAN(ALNGTH*SIN(TILT(K))/X(K))
  IF(ISWTCH.EQ.2) GO TO 10
  IF(ARSIN(COSZ).LE.BETA) GO TO 342
C CALCULATE REFLECTOR AUGMENTATION WITH SHADOW FACTOR.
  REF(I,K)=ZIT(I,K)*AUG(COSZ,TILT(K),BETA,SREFL)
  GO TO 10
C CALCULATE REFLECTOR CAUSED LOSS WITH SHADOW FACTOR.
342 REF(I,K)=ZIT(I,K)*SHDLOS(TILT(K),X(1),ALNGTH,COSZ)
  10 CONTINUE
  3 CONTINUE
C C-----C
C F-----F
  IF(M.EQ.1) GO TO 42
C PRINT THE APPROPRIATE HEADINGS.
C PRINT OUTPUT
  IF(IPRINT.NE.1.AND.IPRINT.NE.3.AND.IPRINT.NE.5) GO TO 506
  IF(MONTH.GT.0) GO TO 40
  DO 40 I=4,10,3
  IF(IPRINT.EQ.0.OR.ISWTCH.GT.1) GO TO 506
  IF(N.EQ.1) WRITE(IUNIT,41)
  IF(N.EQ.1) WRITE(IUNIT,30) (TOWN(JJ),JJ=1,5),LAX,MINUTE
  IF(I.EQ.4.AND.N.NE.1.AND.N.NE.4.AND.N.NE.7.AND.N.NE.10) WRITE(IUNIT,101)
40 CONTINUE
42 IF(M.EQ.0) GO TO 43
  IF(N.EQ.1) GO TO 43
  WRITE(IUNIT,41)
  IF(N.EQ.1) WRITE(IUNIT,30) (TOWN(JJ),JJ=1,5),LAX,MINUTE
41 FORMAT(1H1)
101 FORMAT(/)
  IF(ISWTCH.GT.1) GO TO 506
43 WRITE(IUNIT,31)N,PH,RHO,ZKT(N),ZKD,(ORIENT(J,NO),J=1,3)
31 FORMAT(/,9X,' MONTH:',I4,3X,'HORIZ. HO:',F5.2,10X,'REFLECTIVITY:',
1,F5.2,
1 10X,'KT:',F10.3,10X,'KD:',F10.3//9X,' ORIENTATION:',
1 3A4,16X,'HOURLY SOLAR RADIATION',31X,'DAILY TOTAL'/
1 /21X,'4 5 6 7 8 9 10 11',
* ' 12 13 14 15 16 17 18 19 20',4X,'RADIATION'
1,/10X,'TILT ',5X,83(' '))
C F-----F
C G-----G
C ZERO OUT DAILY TOTAL ARRAYS.
506 DO 12 K=1,NA
  SUMN=0.
  DO 297 L=1,5
297 SUMS(K,L)=0.
  SUMD(K)=0.
  SUMR(K)=0.

```

```

SUMRE(K)=0.
SUM(K)=0.
C G-----G
C
C H-----H
C SUM OVER THE HOURS IN THE DAY TO GET THE DAILY TOTALS.
DO 14 I=1,24
SUMN=SUMN+DNI(I)
SUMD(K)=SUMD(K)+ASI(I,K)
SUMR(K)=SUMR(K)+RSI(I,K)
DO 298 L=1,5
298 SUMS(K,L)=SUMS(K,L)+SHD(I,K,L)
SUMRE(K)=SUMRE(K)+REF(I,K)
14 SUM(K)=SUM(K)+ZIT(I,K)
C H-----H
IF(M.EQ.1.AND.K.EQ.1) WRITE(IUNIT,505)TILD(K),(DNI(I),I=5,21),
1 SUMN
505 FORMAT(' NORM.DIR.',F5.2,4X,F4.2,16F5.2,F10.2)
IF(IPRINT.EQ.0) GO TO 567
C I-----I
C PRINT THE APPROPRIATE TABLES.
GO TO (701,567,703,567,705),IPRINT
701 WRITE(IUNIT,32) TILD(K),(ZIT(I,K),I=
1 5,21),SUM(K)
32 FORMAT(10X,F5.2,4X,F4.2,16F5.2,F10.2)
35 FORMAT(/,2A4,/,3X,'TOTAL ',17F5.0,F10.0,4X,4F6.0)
GO TO 567
703 DO 750 KL=1,5
WRITE(IUNIT,751)
751 FORMAT(10X,'THE FOLLOWING TABLE CONTAINS SHADOW FACTOR')
WRITE(IUNIT,31) N,H0,RHO,ZKT(N),ZKD,(ORIENT(J,N0),J=1,3)
WRITE(IUNIT,32) TILD(K),(SHD(I,K,L),I=5,21),SUMS(K,KL)
750 CONTINUE
GO TO 567
705 WRITE(IUNIT,765)
765 FORMAT(10X,'THE FOLLOWING TABLE CONTAINS BOTH REFLECTOR AND SHADOW
1 FACTORS.')
WRITE(IUNIT,31)
WRITE(IUNIT,32) TILD(K),(REF(I,K),I=5,21),SUMRE(K)
567 CONTINUE
IF(M.EQ.0) GO TO 12
WRITE(IUNIT,503)TILD(K),(ASI(I,K),I=5,21),SUMD(K)
503 FORMAT(3X,'DIRECT',F5.2,4X,17F5.2,F10.2)
WRITE(IUNIT,504) TILD(K),(RSI(I,K),I=5,21),SUMR(K)
504 FORMAT(3X,'DIFFUSE',F5.2,4X,17F5.2,F10.2)
C I-----I
12 CONTINUE
N=N+1
IF(N.GT.12.OR.MONTH.GE.1) GO TO 667
GO TO 134
C REDEFINE THE TILT VALUES IN DEGREES BEFORE RETURNING.
667 DO 668 KP=1,NA
668 TILT(KP)=TILD(KP)
RETURN
END

```



```

C
C
C      FUNCTION SHDLOS CALLED FROM SUBROUTINE INS
C
C      FUNCTION SHDLOS(ALPHA,XA,ALNGTH,SINE)
C
C      THIS SUBPROGRAM COMPUTES AND RETURNS ONE MINUS THE SHADOW LOSS FRACTION(THE
C      PERCENT RECEIVING INSOLATION) DURING HOUR SINE.
C
      XX=XA/ALNGTH
      E=ARSIN(SINE)
      SHDLOS=(COS(ALPHA)+XX)*SIN(E)/SIN(ALPHA+E)
      IF(SHDLOS.LT.0.) SHDLOS=0.
      IF(SHDLOS.GT.1.) SHDLOS=1.0
      RETURN
      END

```

```

C
C
C           FUNCTION AUG CALLED FROM SUBROUTINE INS
C
C           FUNCTION AUG(G,T,B,SREFL)
C
C           THIS SUBPROGRAM COMPUTES AND RETURNS ONE PLUS THE INCREASE IN HOURLY ENERGY
C           DUE TO REFLECTOR AUGMENTATION.
C
      E=ARSIN(G)
      IF(E.LT.2.*B) GO TO 1
      AUG=SREFL*SIN(T)*SIN(E-B)*(1./SIN(B)-(COS(B)/SIN(B)
1+COS(T)/SIN(T))/(SIN(B)*COS(E-2.*B)/SIN(E-2.*B)
1+COS(B))) +1.0
      RETURN
1 AUG=SREFL*SIN(E-B)*SIN(T)/SIN(B) +1.0
      RETURN
      END

```

LOCATION		TUCSON		AZ		LATITUDE		32 DEGREES		7 MINUTES		KD:		0.174						
MONTH:	1	HORIZ. HO:	5.78	REFLECTIVITY:	0.20	KT:	0.599	DAILY TOTAL												
ORIENTATION:		SOUTHEAST		HOURLY SOLAR RADIATION																
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	RADIATION	
TILT																				
0.0		0.0	0.0	0.0	0.01	0.15	0.31	0.45	0.53	0.56	0.53	0.45	0.31	0.15	0.01	0.0	0.0	0.0	3.46	
10.00		0.0	0.0	0.0	0.01	0.22	0.40	0.53	0.61	0.62	0.57	0.46	0.31	0.13	0.01	0.0	0.0	0.0	3.87	
20.00		0.0	0.0	0.0	0.01	0.28	0.48	0.61	0.67	0.66	0.59	0.47	0.30	0.11	0.01	0.0	0.0	0.0	4.18	
25.00		0.0	0.0	0.0	0.01	0.31	0.52	0.64	0.69	0.68	0.60	0.46	0.29	0.10	0.01	0.0	0.0	0.0	4.31	
30.00		0.0	0.0	0.0	0.01	0.34	0.55	0.67	0.71	0.69	0.60	0.46	0.28	0.09	0.01	0.0	0.0	0.0	4.40	
35.00		0.0	0.0	0.0	0.01	0.37	0.58	0.69	0.73	0.69	0.60	0.45	0.27	0.08	0.01	0.0	0.0	0.0	4.47	
40.00		0.0	0.0	0.0	0.01	0.39	0.60	0.71	0.74	0.70	0.59	0.44	0.25	0.07	0.01	0.0	0.0	0.0	4.51	
50.00		0.0	0.0	0.0	0.01	0.43	0.64	0.73	0.75	0.69	0.57	0.41	0.22	0.03	0.01	0.0	0.0	0.0	4.51	
60.00		0.0	0.0	0.0	0.01	0.46	0.66	0.74	0.74	0.67	0.54	0.37	0.19	0.05	0.01	0.0	0.0	0.0	4.42	

MONTH:	2	HORIZ. HO:	7.37	REFLECTIVITY:	0.20	KT:	0.612	KD:	0.171									
ORIENTATION:	SOUTHEAST	HOURLY SOLAR RADIATION														DAILY TOTAL		
TILT	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	RADIATION
0.0	0.0	0.0	0.0	0.06	0.24	0.42	0.56	0.64	0.67	0.64	0.56	0.42	0.24	0.06	0.0	0.0	0.0	4.52
10.00	0.0	0.0	0.0	0.09	0.32	0.51	0.64	0.71	0.72	0.67	0.56	0.40	0.21	0.04	0.0	0.0	0.0	4.88
20.00	0.0	0.0	0.0	0.13	0.39	0.58	0.70	0.76	0.75	0.68	0.55	0.37	0.16	0.03	0.0	0.0	0.0	5.13
25.00	0.0	0.0	0.0	0.14	0.42	0.61	0.73	0.78	0.76	0.68	0.54	0.36	0.16	0.03	0.0	0.0	0.0	5.22
30.00	0.0	0.0	0.0	0.16	0.45	0.64	0.75	0.79	0.77	0.67	0.53	0.34	0.14	0.03	0.0	0.0	0.0	5.27
35.00	0.0	0.0	0.0	0.17	0.48	0.66	0.77	0.80	0.76	0.66	0.51	0.32	0.12	0.03	0.0	0.0	0.0	5.29
40.00	0.0	0.0	0.0	0.19	0.50	0.68	0.78	0.81	0.76	0.65	0.49	0.30	0.10	0.03	0.0	0.0	0.0	5.28
50.00	0.0	0.0	0.0	0.21	0.54	0.71	0.79	0.80	0.74	0.61	0.45	0.25	0.07	0.03	0.0	0.0	0.0	5.19
60.00	0.0	0.0	0.0	0.22	0.56	0.72	0.78	0.77	0.69	0.56	0.39	0.20	0.07	0.02	0.0	0.0	0.0	4.99

MONTH:	3	HORIZ. HO:	9.01	REFLECTIVITY:	0.20	KT:	0.652	KD:	0.161									
ORIENTATION:	SOUTHEAST			HOURLY SOLAR RADIATION												DAILY TOTAL		
	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	RADIATION
TILT																		
0.0	0.0	0.0	0.00	0.15	0.36	0.55	0.69	0.78	0.82	0.78	0.69	0.55	0.36	0.15	0.00	0.0	0.0	5.87
10.00	0.0	0.0	0.00	0.20	0.44	0.63	0.77	0.84	0.85	0.80	0.68	0.51	0.31	0.10	0.00	0.0	0.0	6.14
20.00	0.0	0.0	0.00	0.26	0.51	0.70	0.83	0.88	0.87	0.79	0.65	0.46	0.25	0.05	0.00	0.0	0.0	6.26
25.00	0.0	0.0	0.00	0.28	0.54	0.73	0.85	0.90	0.87	0.78	0.63	0.44	0.22	0.05	0.00	0.0	0.0	6.28
30.00	0.0	0.0	0.00	0.30	0.57	0.75	0.86	0.90	0.87	0.77	0.61	0.41	0.19	0.05	0.00	0.0	0.0	6.27
35.00	0.0	0.0	0.00	0.32	0.59	0.77	0.87	0.90	0.86	0.75	0.58	0.38	0.16	0.05	0.00	0.0	0.0	6.22
40.00	0.0	0.0	0.00	0.34	0.61	0.78	0.88	0.90	0.84	0.72	0.55	0.34	0.12	0.05	0.00	0.0	0.0	6.16
50.00	0.0	0.0	0.00	0.37	0.63	0.79	0.87	0.87	0.80	0.68	0.48	0.27	0.09	0.05	0.00	0.0	0.0	5.89
60.00	0.0	0.0	0.00	0.39	0.64	0.79	0.84	0.82	0.73	0.59	0.40	0.19	0.09	0.04	0.00	0.0	0.0	5.53



LOCATION		TUCSON		AZ		LATITUDE		32 DEGREES		7 MINUTES									
MONTH:	4	HORIZ. NO: 10.48		REFLECTIVITY: 0.20		KT:		0.711		KD:		0.144							
ORIENTATION:		SOUTHEAST		HOURLY SOLAR RADIATION								DAILY TOTAL							
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
TILT		0.0	0.0	0.04	0.25	0.48	0.68	0.84	0.94	0.97	0.94	0.84	0.68	0.43	0.25	0.04	0.0	0.0	7.45
0.00		0.0	0.0	0.06	0.31	0.56	0.76	0.91	0.99	1.00	0.93	0.81	0.63	0.41	0.18	0.02	0.0	0.0	7.56
10.00		0.0	0.0	0.08	0.37	0.62	0.82	0.95	1.01	1.00	0.91	0.76	0.56	0.32	0.10	0.02	0.0	0.0	7.51
20.00		0.0	0.0	0.09	0.39	0.65	0.84	0.96	1.01	0.99	0.89	0.72	0.51	0.28	0.06	0.02	0.0	0.0	7.42
25.00		0.0	0.0	0.10	0.41	0.67	0.85	0.97	1.01	0.97	0.86	0.69	0.47	0.24	0.05	0.02	0.0	0.0	7.32
30.00		0.0	0.0	0.10	0.43	0.69	0.87	0.97	1.00	0.95	0.83	0.65	0.43	0.19	0.06	0.02	0.0	0.0	7.17
35.00		0.0	0.0	0.11	0.45	0.70	0.87	0.97	0.99	0.92	0.79	0.60	0.33	0.14	0.06	0.02	0.0	0.0	6.99
40.00		0.0	0.0	0.12	0.47	0.71	0.86	0.94	0.93	0.85	0.70	0.50	0.28	0.10	0.06	0.02	0.0	0.0	6.54
50.00		0.0	0.0	0.13	0.45	0.70	0.84	0.89	0.86	0.76	0.60	0.39	0.17	0.10	0.06	0.02	0.0	0.0	5.99

MONTH: 5		HORIZ. NO: 11.31		REFLECTIVITY: 0.20		KT:		0.745		KD:		0.127							
ORIENTATION:		SOUTHEAST		HOURLY SOLAR RADIATION						DAILY TOTAL		RADIATION							
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
TILT		0.0	0.0	0.10	0.33	0.56	0.76	0.92	1.02	1.05	1.02	0.92	0.76	0.56	0.33	0.10	0.0	0.0	8.43
0.0		0.0	0.0	0.13	0.38	0.63	0.83	0.97	1.05	1.06	1.00	0.87	0.69	0.47	0.24	0.04	0.0	0.0	8.37
10.00		0.0	0.0	0.16	0.43	0.68	0.87	1.00	1.06	1.05	0.95	0.80	0.60	0.37	0.14	0.03	0.0	0.0	8.15
20.00		0.0	0.0	0.17	0.45	0.70	0.89	1.01	1.06	1.03	0.93	0.76	0.55	0.31	0.09	0.03	0.0	0.0	7.97
25.00		0.0	0.0	0.18	0.47	0.71	0.90	1.01	1.04	1.00	0.89	0.72	0.50	0.26	0.07	0.03	0.0	0.0	7.77
30.00		0.0	0.0	0.19	0.48	0.72	0.90	1.00	1.03	0.97	0.85	0.66	0.44	0.23	0.07	0.03	0.0	0.0	7.54
35.00		0.0	0.0	0.20	0.49	0.73	0.90	0.99	1.00	0.94	0.80	0.61	0.38	0.14	0.07	0.03	0.0	0.0	7.27
40.00		0.0	0.0	0.20	0.49	0.73	0.90	0.99	1.00	0.94	0.80	0.61	0.38	0.14	0.07	0.03	0.0	0.0	7.27
45.00		0.0	0.0	0.21	0.50	0.73	0.87	0.94	0.93	0.85	0.69	0.49	0.26	0.10	0.07	0.03	0.0	0.0	6.67
50.00		0.0	0.0	0.21	0.50	0.73	0.87	0.94	0.93	0.85	0.69	0.49	0.26	0.10	0.07	0.03	0.0	0.0	6.67
55.00		0.0	0.0	0.21	0.50	0.73	0.87	0.94	0.93	0.85	0.69	0.49	0.26	0.10	0.07	0.03	0.0	0.0	5.95
60.00		0.0	0.0	0.21	0.50	0.73	0.87	0.94	0.93	0.85	0.69	0.49	0.26	0.10	0.07	0.03	0.0	0.0	5.95

MONTH: 6		HORIZ. NO: 11.58		REFLECTIVITY: 0.20		KT: 0.743		KD: 0.128													
ORIENTATION: SOUTHEAST		HOURLY SOLAR RADIATION																		DAILY TOTAL	
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	RADIATION		
TILT																					
0.0	0.0	0.00	0.12	0.35	0.57	0.77	0.93	1.02	1.06	1.02	0.92	0.77	0.57	0.35	0.12	0.00	0.0	0.0	8.60		
0.0	0.0	0.00	0.15	0.40	0.63	0.83	0.97	1.05	1.06	1.00	0.83	0.70	0.48	0.25	0.06	0.00	0.0	0.0	8.48		
10.00	10.00	0.00	0.18	0.44	0.68	0.87	1.00	1.05	1.04	0.95	0.80	0.60	0.38	0.15	0.04	0.00	0.0	0.0	8.18		
20.00	20.00	0.00	0.19	0.46	0.70	0.88	1.00	1.04	1.02	0.92	0.76	0.55	0.32	0.10	0.04	0.00	0.0	0.0	7.97		
25.00	25.00	0.00	0.20	0.47	0.71	0.88	0.99	1.03	0.99	0.88	0.71	0.50	0.27	0.07	0.04	0.00	0.0	0.0	7.73		
30.00	30.00	0.00	0.20	0.47	0.71	0.88	0.98	1.03	0.96	0.83	0.66	0.44	0.21	0.07	0.04	0.00	0.0	0.0	7.48		
35.00	35.00	0.00	0.21	0.48	0.71	0.88	0.98	1.01	0.95	0.82	0.66	0.43	0.21	0.07	0.04	0.00	0.0	0.0	7.18		
40.00	40.00	0.00	0.21	0.49	0.72	0.88	0.97	0.99	0.92	0.79	0.63	0.38	0.15	0.07	0.03	0.00	0.0	0.0	6.53		
50.00	50.00	0.00	0.22	0.50	0.73	0.88	0.95	0.91	0.80	0.82	0.67	0.45	0.25	0.10	0.07	0.03	0.00	0.0	6.53		
60.00	60.00	0.00	0.23	0.49	0.68	0.80	0.80	0.84	0.81	0.71	0.55	0.35	0.14	0.11	0.07	0.03	0.00	0.0	5.79		

MONTH: 7		LOCATION		TUCSON		AZ		LATITUDE		32 DEGREES		7 MINUTES		KD:		0.160				
HORIZ. HD: 11.29		TUCSON		REFLECTIVITY: 0.20		KT:		0.656												
ORIENTATION: SOUTHEAST		HOURLY SOLAR RADIATION														DAILY TOTAL				
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	RADIATION	
<hr/>																				
TILT																				
0.0	0.0	0.0	0.12	0.33	0.54	0.67	0.80	0.89	0.92	0.89	0.80	0.67	0.49	0.29	0.09	0.0	0.0	0.0	7.38	
10.00	0.0	0.0	0.16	0.37	0.58	0.75	0.87	0.92	0.91	0.84	0.71	0.54	0.36	0.14	0.04	0.0	0.0	0.0	7.23	
20.00	0.0	0.0	0.16	0.39	0.60	0.76	0.87	0.92	0.89	0.81	0.67	0.49	0.29	0.10	0.04	0.0	0.0	0.0	7.14	
25.00	0.0	0.0	0.16	0.39	0.60	0.76	0.87	0.92	0.89	0.81	0.67	0.49	0.29	0.10	0.04	0.0	0.0	0.0	6.99	
30.00	0.0	0.0	0.15	0.40	0.61	0.77	0.87	0.90	0.87	0.78	0.64	0.45	0.25	0.08	0.04	0.0	0.0	0.0	6.81	
35.00	0.0	0.0	0.16	0.41	0.62	0.77	0.86	0.89	0.85	0.75	0.59	0.41	0.20	0.08	0.04	0.0	0.0	0.0	6.62	
40.00	0.0	0.0	0.15	0.42	0.62	0.77	0.85	0.87	0.82	0.71	0.55	0.36	0.16	0.03	0.04	0.0	0.0	0.0	6.39	
50.00	0.0	0.0	0.17	0.42	0.61	0.76	0.81	0.81	0.74	0.62	0.45	0.26	0.12	0.03	0.04	0.0	0.0	0.0	5.37	
60.00	0.0	0.0	0.18	0.42	0.59	0.70	0.75	0.73	0.65	0.51	0.34	0.15	0.12	0.08	0.03	0.0	0.0	0.0	5.26	

MONTH: 8		HORIZ. HD: 10.40		REFLECTIVITY: 0.20												KT: 0.662		KD: 0.158		
ORIENTATION: SOUTHEAST		HOURLY SOLAR RADIATION												DAILY TOTAL		RADIATION				
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
TILT																				
0.0	0.0	0.0	0.0	0.04	0.23	0.44	0.43	0.78	0.87	0.90	0.87	0.78	0.63	0.44	0.23	0.04	0.0	0.0	6.88	
10.00	0.0	0.0	0.0	0.05	0.23	0.51	0.50	0.84	0.91	0.92	0.87	0.75	0.58	0.33	0.17	0.02	0.0	0.0	6.38	
20.00	0.0	0.0	0.0	0.07	0.33	0.55	0.75	0.87	0.93	0.92	0.89	0.70	0.52	0.31	0.13	0.02	0.0	0.0	6.93	
25.00	0.0	0.0	0.0	0.07	0.35	0.59	0.77	0.88	0.93	0.91	0.82	0.67	0.46	0.22	0.07	0.02	0.0	0.0	6.84	
30.00	0.0	0.0	0.0	0.08	0.37	0.60	0.78	0.89	0.93	0.90	0.80	0.64	0.44	0.23	0.07	0.02	0.0	0.0	6.74	
35.00	0.0	0.0	0.0	0.09	0.38	0.62	0.79	0.89	0.93	0.88	0.77	0.59	0.40	0.19	0.07	0.02	0.0	0.0	6.61	
40.00	0.0	0.0	0.0	0.09	0.39	0.63	0.79	0.88	0.90	0.85	0.73	0.58	0.35	0.14	0.07	0.02	0.0	0.0	6.43	
50.00	0.0	0.0	0.0	0.10	0.41	0.64	0.79	0.86	0.85	0.79	0.65	0.47	0.27	0.11	0.07	0.02	0.0	0.0	6.02	
60.00	0.0	0.0	0.0	0.10	0.42	0.63	0.76	0.81	0.79	0.70	0.56	0.33	0.17	0.11	0.06	0.02	0.0	0.0	5.51	

MONTH: 9		HORIZ. HD: 8.95		REFLECTIVITY: 0.20		KT: 0.697		KD: 0.150												
ORIENTATION: SOUTHEAST		HOURLY SOLAR RADIATION						DAILY TOTAL												
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	RADIATION	
TILT																				
0.0	0.0	0.0	0.0	0.00	0.15	0.37	0.55	0.74	0.84	0.87	0.84	0.74	0.58	0.37	0.15	0.00	0.0	0.0	6.24	
10.00	0.0	0.0	0.0	0.00	0.21	0.44	0.67	0.82	0.91	0.92	0.85	0.72	0.54	0.32	0.10	0.00	0.0	0.0	6.53	
20.00	0.0	0.0	0.0	0.00	0.25	0.54	0.75	0.89	0.95	0.94	0.85	0.69	0.49	0.26	0.05	0.00	0.0	0.0	6.66	
25.00	0.0	0.0	0.0	0.00	0.29	0.57	0.78	0.91	0.96	0.94	0.84	0.67	0.45	0.23	0.05	0.00	0.0	0.0	6.69	
30.00	0.0	0.0	0.0	0.00	0.31	0.60	0.80	0.93	0.97	0.93	0.82	0.65	0.43	0.19	0.05	0.00	0.0	0.0	6.63	
35.00	0.0	0.0	0.0	0.00	0.33	0.63	0.82	0.94	0.97	0.92	0.80	0.62	0.39	0.16	0.04	0.00	0.0	0.0	6.62	
40.00	0.0	0.0	0.0	0.00	0.35	0.65	0.84	0.94	0.96	0.91	0.77	0.55	0.36	0.12	0.04	0.00	0.0	0.0	6.53	
50.00	0.0	0.0	0.0	0.00	0.38	0.68	0.85	0.94	0.95	0.85	0.71	0.51	0.23	0.03	0.04	0.00	0.0	0.0	6.26	
60.00	0.0	0.0	0.0	0.00	0.40	0.69	0.84	0.91	0.88	0.79	0.63	0.42	0.19	0.03	0.04	0.00	0.0	0.0	5.88	

MONTH: 10		LOCATION TUCSON		AZ		LATITUDE		32 DEGREES		7 MINUTES		KD: 0.150								
HORIZ. HO: 7.27		REFLECTIVITY: 0.20		KT: 0.695		KT: 0.695		KT: 0.695		KT: 0.695		KD: 0.150								
ORIENTATION: SOUTHEAST		HOURLY SOLAR RADIATION		HOURLY SOLAR RADIATION		HOURLY SOLAR RADIATION		HOURLY SOLAR RADIATION		HOURLY SOLAR RADIATION		DAILY TOTAL RADIATION								
TILT		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	RADIATION	
0.0	0.0	0.0	0.0	0.0	0.05	0.26	0.4	0.63	0.73	0.76	0.73	0.63	0.47	0.26	0.05	0.0	0.0	0.0	5.05	
10.00	0.0	0.0	0.0	0.0	0.09	0.36	0.57	0.73	0.81	0.82	0.76	0.63	0.45	0.23	0.03	0.0	0.0	0.0	5.50	
20.00	0.0	0.0	0.0	0.0	0.13	0.44	0.67	0.81	0.88	0.86	0.78	0.62	0.42	0.19	0.02	0.0	0.0	0.0	5.82	
25.00	0.0	0.0	0.0	0.0	0.15	0.48	0.71	0.85	0.90	0.88	0.78	0.61	0.40	0.16	0.02	0.0	0.0	0.0	5.93	
30.00	0.0	0.0	0.0	0.0	0.16	0.52	0.74	0.87	0.92	0.88	0.77	0.59	0.37	0.14	0.02	0.0	0.0	0.0	6.00	
35.00	0.0	0.0	0.0	0.0	0.18	0.55	0.77	0.90	0.93	0.88	0.76	0.58	0.35	0.12	0.02	0.0	0.0	0.0	6.04	
40.00	0.0	0.0	0.0	0.0	0.19	0.58	0.80	0.91	0.94	0.89	0.75	0.55	0.32	0.09	0.02	0.0	0.0	0.0	6.04	
50.00	0.0	0.0	0.0	0.0	0.22	0.62	0.83	0.93	0.93	0.85	0.70	0.50	0.27	0.06	0.02	0.0	0.0	0.0	5.94	
60.00	0.0	0.0	0.0	0.0	0.23	0.65	0.84	0.92	0.90	0.81	0.64	0.44	0.21	0.06	0.02	0.0	0.0	0.0	5.72	

MONTH: 11		HORIZ. HO: 5.74		REFLECTIVITY: 0.20		KT: 0.663		KD: 0.158											
ORIENTATION: SOUTHEAST		HOURLY SOLAR RADIATION		HOURLY SOLAR RADIATION		HOURLY SOLAR RADIATION		DAILY TOTAL RADIATION											
TILT		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	RADIATION
0.0	0.0	0.0	0.0	0.0	0.01	0.16	0.34	0.49	0.59	0.62	0.59	0.49	0.34	0.16	0.01	0.0	0	0.0	3.80
10.00	0.0	0.0	0.0	0.0	0.01	0.24	0.45	0.50	0.55	0.69	0.63	0.51	0.34	0.14	0.01	0.0	0.0	0.0	4.29
20.00	0.0	0.0	0.0	0.0	0.01	0.32	0.54	0.69	0.75	0.74	0.65	0.52	0.32	0.12	0.01	0.0	0.0	0.0	4.67
25.00	0.0	0.0	0.0	0.0	0.01	0.35	0.58	0.72	0.78	0.76	0.67	0.51	0.31	0.11	0.01	0.0	0.0	0.0	4.82
30.00	0.0	0.0	0.0	0.0	0.01	0.38	0.60	0.76	0.81	0.78	0.67	0.51	0.30	0.09	0.01	0.0	0.0	0.0	4.93
35.00	0.0	0.0	0.0	0.0	0.01	0.41	0.61	0.79	0.83	0.79	0.67	0.50	0.29	0.08	0.01	0.0	0.0	0.0	5.02
40.00	0.0	0.0	0.0	0.0	0.01	0.44	0.61	0.81	0.84	0.79	0.67	0.49	0.28	0.07	0.00	0.0	0.0	0.0	5.07
50.00	0.0	0.0	0.0	0.0	0.01	0.49	0.72	0.84	0.85	0.78	0.65	0.46	0.24	0.05	0.00	0.0	0.0	0.0	5.09
60.00	0.0	0.0	0.0	0.0	0.01	0.52	0.75	0.85	0.84	0.76	0.61	0.42	0.20	0.04	0.00	0.0	0.0	0.0	5.00

MONTH: 12		HORIZ. HO: 5.15		REFLECTIVITY: 0.20										KT: 0.610		KD: 0.171				
ORIENTATION: SOUTHEAST		HOURLY SOLAR RADIATION										DAILY TOTAL		RADIATION						
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
TILT																				
0.0	0.0	0.0	0.0	0.0	0.0	0.11	0.28	0.41	0.50	0.53	0.50	0.41	0.28	0.11	0.0	0.0	0.0	0.0	3.14	
10.00	0.0	0.0	0.0	0.0	0.0	0.18	0.37	0.51	0.58	0.59	0.54	0.43	0.28	0.10	0.0	0.0	0.0	0.0	3.58	
20.00	0.0	0.0	0.0	0.0	0.0	0.24	0.45	0.59	0.65	0.64	0.57	0.44	0.27	0.09	0.0	0.0	0.0	0.0	3.94	
25.00	0.0	0.0	0.0	0.0	0.0	0.27	0.49	0.62	0.68	0.66	0.58	0.44	0.27	0.03	0.0	0.0	0.0	0.0	4.09	
30.00	0.0	0.0	0.0	0.0	0.0	0.30	0.53	0.65	0.70	0.67	0.59	0.44	0.26	0.07	0.0	0.0	0.0	0.0	4.20	
35.00	0.0	0.0	0.0	0.0	0.0	0.32	0.56	0.68	0.72	0.69	0.59	0.44	0.25	0.06	0.0	0.0	0.0	0.0	4.30	
40.00	0.0	0.0	0.0	0.0	0.0	0.34	0.58	0.70	0.73	0.69	0.59	0.43	0.24	0.06	0.0	0.0	0.0	0.0	4.36	
50.00	0.0	0.0	0.0	0.0	0.0	0.38	0.62	0.73	0.75	0.69	0.57	0.41	0.21	0.04	0.0	0.0	0.0	0.0	4.41	
60.00	0.0	0.0	0.0	0.0	0.0	0.41	0.65	0.74	0.74	0.67	0.55	0.38	0.19	0.04	0.0	0.0	0.0	0.0	4.36	

LOCATION: TUCSON				AZ	LATITUDE: 32 DEGREES		7 MINUTES							
MONTH	TILT	ORIENTATION	GND. REFL.	UNOBSTRUCTED INSOLATION	INSOLATION W/ SHADOW		FRACTION LOST							
				ARRAY SPACING(METERS)										
				3.00	4.00	5.00	6.00	8.00	3.00	4.00	5.00	6.00	8.00	
1	28.40	SOUTH	0.20	4.88	4.42	4.62	4.72	4.77	4.35	0.09	0.05	0.03	0.02	0.01
2	28.40	SOUTH	0.20	5.69	5.34	5.47	5.55	5.61	5.62	0.06	0.04	0.03	0.02	0.01
3	28.40	SOUTH	0.20	6.62	6.36	6.50	6.53	6.56	6.61	0.04	0.02	0.01	0.01	0.00
4	28.40	SOUTH	0.20	7.49	7.33	7.39	7.44	7.47	7.47	0.02	0.01	0.01	0.00	0.00
5	28.40	SOUTH	0.20	7.77	7.64	7.71	7.74	7.75	7.76	0.02	0.01	0.00	0.00	0.00
6	28.40	SOUTH	0.20	7.68	7.55	7.63	7.65	7.65	7.67	0.02	0.01	0.00	0.00	0.00
7	28.40	SOUTH	0.20	6.82	6.69	6.76	6.79	6.80	6.81	0.02	0.01	0.00	0.00	0.00
8	28.40	SOUTH	0.20	6.91	6.75	6.81	6.85	6.83	6.88	0.02	0.01	0.00	0.00	0.00
9	28.40	SOUTH	0.20	7.06	6.80	6.94	6.97	7.00	7.05	0.02	0.01	0.01	0.00	0.00
10	28.40	SOUTH	0.20	6.53	6.13	6.28	6.37	6.44	6.45	0.04	0.02	0.01	0.01	0.00
11	28.40	SOUTH	0.20	5.50	4.97	5.21	5.33	5.38	5.47	0.06	0.04	0.02	0.01	0.01
12	28.40	SOUTH	0.20	4.71	4.14	4.39	4.52	4.58	4.64	0.09	0.05	0.03	0.02	0.01
										0.12	0.07	0.04	0.03	0.02
ANNUAL AMOUNTS:				2363.05	2255.71	2322.75	2326.37	2338.34	2351.42					
ANNUAL FRACTION LOST:					0.05	0.03	0.02	0.01	0.00					

LOCATION: TUCSON      AZ      LATITUDE: 32 DEGREES 7 MINUTES  
 ARRAY SPACING = 3.00 METERS

MONTH	ARR. TILT	REFL. TILT	SPEC. REFL.	GND REFL.	INSOL. W/OUT SHADOW, REFL.	INSOL. W/REFL. AUG.	FRAC. GAIN
1	28.40	32.38	0.75	0.20	4.88	4.53	-0.07
2	28.40	32.38	0.75	0.20	5.69	5.81	0.02
3	28.40	32.38	0.75	0.20	6.62	7.43	0.12
4	28.40	32.38	0.75	0.20	7.49	8.95	0.19
5	28.40	32.38	0.75	0.20	7.77	9.24	0.19
6	28.40	32.38	0.75	0.20	7.68	9.09	0.18
7	28.40	32.38	0.75	0.20	6.82	8.08	0.18
8	28.40	32.38	0.75	0.20	6.91	8.25	0.19
9	28.40	32.38	0.75	0.20	7.06	7.96	0.13
10	28.40	32.38	0.75	0.20	6.53	6.66	0.02
11	28.40	32.38	0.75	0.20	5.50	5.11	-0.07
12	28.40	32.38	0.75	0.20	4.71	4.16	-0.12
ANNUAL AMOUNTS:					2363.05	2595.18	0.10

LOCATION: TUCSON      AZ      LATITUDE: 32 DEGREES 7 MINUTES  
 ARRAY SPACING = 7.00 METERS

MONTH	ARR. TILT	REFL. TILT	SPEC. REFL.	GND REFL.	INSOL. W/OUT SHADOW, REFL.	INSOL. W/REFL. AUG.	FRAC. GAIN
1	28.40	15.20	0.75	0.20	4.88	6.03	0.24
2	28.40	15.20	0.75	0.20	5.69	6.79	0.19
3	28.40	15.20	0.75	0.20	6.62	7.44	0.12
4	28.40	15.20	0.75	0.20	7.49	7.84	0.05
5	28.40	15.20	0.75	0.20	7.77	7.68	-0.01
6	28.40	15.20	0.75	0.20	7.68	7.45	-0.03
7	28.40	15.20	0.75	0.20	6.82	6.74	-0.01
8	28.40	15.20	0.75	0.20	6.91	7.21	0.04
9	28.40	15.20	0.75	0.20	7.06	7.92	0.12
10	28.40	15.20	0.75	0.20	6.53	7.80	0.20
11	28.40	15.20	0.75	0.20	5.50	6.81	0.24
12	28.40	15.20	0.75	0.20	4.71	5.76	0.22
ANNUAL AMOUNTS:					2363.05	2599.37	0.10

LOCATION: TUCSON AZ LATITUDE: 32 DEGREES 7 MINUTES  
 ARRAY SPACING = 11.00 METERS

MONTH	ARR. TILT	REFL. TILT	SPEC. REFL.	GND REFL.	INSOL. W/OUT SHADOW, REFL.	INSOL. W/REFL. AUG.	FRAC. GAIN
1	28.40	9.81	0.75	0.20	4.88	5.82	0.19
2	28.40	9.81	0.75	0.20	5.69	6.35	0.12
3	28.40	9.81	0.75	0.20	6.62	6.79	0.03
4	28.40	9.81	0.75	0.20	7.49	6.99	-0.07
5	28.40	9.81	0.75	0.20	7.77	6.79	-0.13
6	28.40	9.81	0.75	0.20	7.68	6.56	-0.15
7	28.40	9.81	0.75	0.20	6.82	5.97	-0.13
8	28.40	9.81	0.75	0.20	6.91	6.43	-0.07
9	28.40	9.81	0.75	0.20	7.05	7.21	-0.02
10	28.40	9.81	0.75	0.20	6.53	7.29	0.12
11	28.40	9.81	0.75	0.20	5.50	6.57	0.19
12	28.40	9.81	0.75	0.20	4.71	5.78	0.23

ANNUAL AMOUNTS: 2363.05 2388.89 0.01

LOCATION: TUCSON AZ LATITUDE: 32 DEGREES 7 MINUTES  
 ARRAY SPACING = 15.00 METERS

MONTH	ARR. TILT	REFL. TILT	SPEC. REFL.	GND REFL.	INSOL. W/OUT SHADOW, REFL.	INSOL. W/REFL. AUG.	FRAC. GAIN
1	28.40	7.23	0.75	0.20	4.88	5.62	0.15
2	28.40	7.23	0.75	0.20	5.69	6.05	0.06
3	28.40	7.23	0.75	0.20	6.62	6.42	-0.03
4	28.40	7.23	0.75	0.20	7.49	6.53	-0.13
5	28.40	7.23	0.75	0.20	7.77	6.32	-0.19
6	28.40	7.23	0.75	0.20	7.68	6.10	-0.21
7	28.40	7.23	0.75	0.20	6.82	5.56	-0.19
8	28.40	7.23	0.75	0.20	6.91	6.01	-0.13
9	28.40	7.23	0.75	0.20	7.05	6.82	-0.03
10	28.40	7.23	0.75	0.20	6.53	6.95	0.07
11	28.40	7.23	0.75	0.20	5.50	6.34	0.15
12	28.40	7.23	0.75	0.20	4.71	5.56	0.18

ANNUAL AMOUNTS: 2363.05 2258.37 -0.04

LOCATION: TUCSON      AZ      LATITUDE: 32 DEGREES 7 MINUTES  
 ARRAY SPACING = 19.00 METERS

MONTH	ARR. TILT	REFL. TILT	SPEC. REFL.	GND REFL.	INSOL. W/OUT SHADOW, REFL.	INSOL. W/REFL. AUG.	FRAC. GAIN
1	28.40	5.72	0.75	0.20	6.88	5.49	0.12
2	28.40	5.72	0.75	0.20	5.69	5.86	0.03
3	28.40	5.72	0.75	0.20	6.62	6.20	-0.06
4	28.40	5.72	0.75	0.20	7.49	6.26	-0.16
5	28.40	5.72	0.75	0.20	7.77	6.05	-0.22
6	28.40	5.72	0.75	0.20	7.68	5.83	-0.24
7	28.40	5.72	0.75	0.20	6.82	5.32	-0.22
8	28.40	5.72	0.75	0.20	6.91	5.76	-0.17
9	28.40	5.72	0.75	0.20	7.06	6.58	-0.07
10	28.40	5.72	0.75	0.20	6.53	6.72	0.03
11	28.40	5.72	0.75	0.20	5.50	6.19	0.13
12	28.40	5.72	0.75	0.20	4.71	5.45	0.16
ANNUAL AMOUNTS:					2363.05	2180.71	-0.08

```

C THIS PROGRAM GENERATES THE M FACTOR TABLE.
C
  DIMENSION DDEC(12),B(12),DLAT(51),FAC(12),R(12)
  DATA DDEC /-19.51,-10.28,.2,
1 11.56,20.14,23.27,20.26,12.03,.37,-10.47,-19.58,-23.27/
  DATA B /-142,.144,.156,.18,.196,.205,.207,.201,
1 .177,.16,.149,.142/
  DATA R /1.03,1.0207,1.0057,.9875,.9727,.967,
1 .9692,.9785,.9945,1.0133,1.0267,1.0327/
  PI=3.1416
C SET THE OUTPUT UNIT
  IUNIT=6
C SET THE SOLAR CONSTANT(AND THUS THE UNITS).
  SC=1.377
  WRITE(IUNIT,60)
60 FORMAT(/,20X,' THE VALUE OF THE M FACTOR ')
  WRITE(IUNIT,70)
70 FORMAT(/,5X,'LAT.',27X,'MONTH')
  WRITE(IUNIT,80)
80 FORMAT(/5X,'DEG. 1 2 3 4 5 6 7 8'
1 , ' 9 10 11 12')
  WRITE(IUNIT,81)
81 FORMAT(/)
  DO 10 I=1,51
    DLAT(I)=I-1.
    XLAT=INT(DLAT(I))
    RLAT=(XLAT+(DLAT(I)-XLAT)/.6)*PI/180.
    DO 20 J=1,12
      XDEC=INT(DDEC(J))
      RDEC=(XDEC+(DDEC(J)-XDEC)/.6)*PI/180.
      COSWS=(-SIN(RLAT)/COS('LAT'))*(SIN(RDEC)/COS(RDEC))
      WS=ARCCOS(COSWS)
      DWS=WS*180./PI
      COSLD=COS(RLAT)*COS(RDEC)
      SINLD=SIN(RLAT)*SIN(RDEC)
      S=0.
      DO 30 N=1,39
        W=WS*N/40.
        COSZ=COSLD*COS(W)+SINLD
        PAR=-B(J)/COSZ
        APA=ABS(PAR)
        IF(APA.GT.80) GO TO 40
        ANS=EXP(PAR)*COSZ
        GO TO 50
40 ANS=0.
50 S=ANS+S
30 CONTINUE
    ANSO=EXP(-B(J)/(COSLD+SINLD))*(COSLD+SINLD)/2.
    AINT=WS/40.*(ANSO+S)
    THO=R(J)*SC*(COSLD*SIN(WS)+WS*SINLD)
    FAC(J)=THO/AINT
20 CONTINUE
  WRITE(IUNIT,90) DLAT(I),(FAC(MM),MM=1,12)
90 FORMAT(5X,F3.0,2X,12F5.2)
  DO 1 K=10,50,10
    IF(I.EQ.K) WRITE(IUNIT,81)
1 CONTINUE
10 CONTINUE
  STOP
  END

```



# APPENDIX B

## SOLAR CLIMATE PARAMETER DATA FOR 235 LOCALITIES

The following pages provide solar climate parameter data for 235 localities in the United States (see Reference 10). Latitudes are in degree-minute form.

$$\bar{K}_T = \frac{\text{average daily total radiation for month } M}{\text{average daily total extraterrestrial radiation for month } M},$$

M = 1, 2, . . . , 12

LOCATION	LAT. (DEG.MIN)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
ADAK	AK 51.53	0.301	0.318	0.342	0.355	0.339	0.319	0.322	0.329	0.363	0.397	0.406	0.312
ANNETTE	AK 55.02	0.295	0.315	0.348	0.409	0.428	0.397	0.418	0.416	0.417	0.364	0.368	0.330
BETHEL	AK 60.47	0.303	0.361	0.444	0.458	0.432	0.414	0.383	0.353	0.420	0.436	0.432	0.311
JUNEAU	AK 58.22	0.267	0.280	0.341	0.387	0.380	0.385	0.374	0.368	0.357	0.327	0.348	0.252
KING SALMON	AK 58.41	0.349	0.381	0.451	0.448	0.437	0.419	0.407	0.390	0.439	0.492	0.494	0.376
KODIAK	AK 57.45	0.321	0.341	0.430	0.444	0.404	0.416	0.413	0.430	0.437	0.483	0.431	0.364
NOME	AK 64.30	0.187	0.332	0.429	0.476	0.474	0.477	0.455	0.400	0.455	0.572	0.521	0.383
SUMMIT	AK 63.25	0.270	0.340	0.455	0.499	0.490	0.445	0.422	0.414	0.457	0.484	0.531	0.243
YAKUTAT	AK 59.31	0.264	0.281	0.361	0.394	0.375	0.366	0.357	0.356	0.366	0.376	0.364	0.267
BIRMINGHAM	AL 33.24	0.402	0.425	0.481	0.506	0.517	0.521	0.505	0.526	0.520	0.540	0.492	0.424
MOBILE	AL 30.41	0.434	0.458	0.485	0.515	0.523	0.511	0.480	0.495	0.503	0.549	0.504	0.444
MONTGOMERY	AL 32.18	0.412	0.435	0.470	0.521	0.529	0.537	0.514	0.530	0.518	0.549	0.505	0.443
FORT SMITH	AR 35.20	0.447	0.455	0.476	0.493	0.533	0.565	0.576	0.577	0.548	0.556	0.515	0.488
LITTLE ROCK	AR 34.44	0.431	0.451	0.473	0.490	0.537	0.570	0.567	0.570	0.550	0.562	0.503	0.452
PHOENIX	AZ 33.26	0.579	0.603	0.644	0.712	0.746	0.744	0.694	0.699	0.720	0.702	0.657	0.597
PRESCOTT	AZ 34.39	0.598	0.600	0.640	0.692	0.732	0.748	0.644	0.641	0.708	0.704	0.675	0.620
TUCSON	AZ 32.07	0.599	0.612	0.652	0.711	0.745	0.743	0.654	0.662	0.697	0.693	0.663	0.610
WINSLOW	AZ 35.01	0.588	0.601	0.644	0.695	0.723	0.734	0.655	0.657	0.701	0.696	0.671	0.607
YUMA	AZ 32.40	0.607	0.623	0.675	0.727	0.761	0.765	0.685	0.708	0.726	0.712	0.678	0.624
ARCATA	CA 40.59	0.389	0.412	0.444	0.499	0.516	0.528	0.506	0.501	0.528	0.495	0.440	0.410
BAKERSFIELD	CA 35.25	0.462	0.503	0.575	0.639	0.699	0.744	0.749	0.744	0.728	0.676	0.572	0.457
CHINA LAKE	CA 35.41	0.553	0.565	0.632	0.682	0.710	0.743	0.729	0.805	0.726	0.687	0.633	0.585
DAUGHERTY	CA 34.52	0.567	0.578	0.640	0.692	0.722	0.749	0.726	0.731	0.729	0.695	0.647	0.591
EL TORO	CA 33.40	0.540	0.545	0.573	0.584	0.577	0.595	0.600	0.657	0.622	0.607	0.590	0.562
FRESNO	CA 36.46	0.614	0.647	0.718	0.643	0.692	0.738	0.749	0.750	0.737	0.683	0.564	0.417
LONG BEACH	CA 33.44	0.532	0.537	0.574	0.597	0.575	0.580	0.642	0.641	0.610	0.595	0.579	0.550
LOS ANGELES	CA 33.56	0.533	0.538	0.578	0.591	0.574	0.575	0.644	0.635	0.604	0.592	0.582	0.554
MOUNT SHASTA	CA 41.19	0.418	0.450	0.452	0.554	0.612	0.655	0.722	0.703	0.688	0.616	0.494	0.448
NEEDLES	CA 34.66	0.581	0.610	0.658	0.705	0.739	0.756	0.709	0.698	0.730	0.703	0.648	0.614
OAKLAND	CA 37.44	0.461	0.489	0.545	0.593	0.617	0.634	0.648	0.638	0.640	0.592	0.540	0.489
POINT MUGU	CA 34.07	0.536	0.542	0.585	0.592	0.562	0.557	0.591	0.591	0.579	0.585	0.586	0.564
RED BLUFF	CA 40.09	0.406	0.454	0.524	0.598	0.644	0.700	0.747	0.729	0.717	0.636	0.507	0.429
SACRAMENTO	CA 38.31	0.400	0.460	0.551	0.621	0.679	0.723	0.751	0.740	0.725	0.694	0.528	0.420
SAN DIEGO	CA 32.44	0.542	0.548	0.575	0.584	0.558	0.561	0.610	0.625	0.609	0.603	0.594	0.565
SAN FRANCISCO	CA 37.37	0.459	0.484	0.544	0.592	0.621	0.641	0.658	0.658	0.654	0.597	0.537	0.483
SANTA MARIA	CA 34.54	0.506	0.515	0.571	0.585	0.596	0.636	0.653	0.646	0.628	0.621	0.581	0.543
SUNNYVALE	CA 37.25	0.475	0.495	0.553	0.599	0.635	0.662	0.681	0.673	0.659	0.605	0.547	0.494
COLORADO SPRINGS	CO 38.44	0.603	0.581	0.588	0.600	0.594	0.638	0.618	0.634	0.671	0.681	0.645	0.618
DENVER	CO 39.45	0.589	0.568	0.589	0.587	0.596	0.633	0.635	0.643	0.667	0.667	0.625	0.603
EAGLE	CO 39.39	0.527	0.542	0.577	0.633	0.630	0.675	0.667	0.655	0.682	0.669	0.612	0.567
GRAND JUNCTION	CO 39.07	0.542	0.555	0.592	0.618	0.664	0.700	0.689	0.684	0.703	0.679	0.634	0.586
PUEBLO	CO 38.17	0.594	0.570	0.589	0.606	0.603	0.656	0.645	0.656	0.674	0.673	0.639	0.605
HARTFORD	CT 41.56	0.365	0.381	0.389	0.417	0.439	0.453	0.462	0.454	0.461	0.463	0.384	0.352
WASHINGTON-SYRLEIGH	DC 38.57	0.389	0.403	0.428	0.454	0.480	0.512	0.508	0.506	0.512	0.505	0.446	0.383
WILMINGTON	DE 39.40	0.399	0.416	0.447	0.462	0.478	0.507	0.510	0.508	0.509	0.503	0.454	0.401
APALACHICOLA	FL 29.44	0.436	0.461	0.503	0.561	0.584	0.547	0.508	0.508	0.528	0.569	0.535	0.464
DAYTONA BEACH	FL 29.11	0.483	0.492	0.526	0.561	0.550	0.501	0.500	0.505	0.505	0.515	0.525	0.486
JACKSONVILLE	FL 30.30	0.469	0.483	0.523	0.555	0.546	0.515	0.504	0.511	0.499	0.515	0.523	0.475
MIAMI	FL 25.48	0.493	0.505	0.528	0.549	0.519	0.474	0.497	0.486	0.483	0.507	0.522	0.517
ORLANDO	FL 28.33	0.495	0.499	0.534	0.565	0.557	0.504	0.505	0.502	0.509	0.531	0.546	0.507
TALLAHASSEE	FL 30.23	0.456	0.471	0.508	0.545	0.541	0.515	0.489	0.505	0.516	0.554	0.528	0.471
TAMPA	FL 27.58	0.493	0.500	0.535	0.567	0.560	0.509	0.492	0.495	0.505	0.542	0.544	0.504
WEST PALM BEACH	FL 26.41	0.473	0.480	0.517	0.537	0.518	0.472	0.501	0.496	0.474	0.483	0.505	0.498
ATLANTA	GA 33.39	0.409	0.427	0.464	0.510	0.517	0.519	0.506	0.521	0.509	0.536	0.507	0.435
AUGUSTA	GA 33.22	0.425	0.445	0.475	0.523	0.520	0.517	0.503	0.508	0.503	0.542	0.522	0.461
MACON	GA 32.42	0.426	0.441	0.480	0.524	0.525	0.522	0.498	0.522	0.510	0.547	0.525	0.455
SAVANNAH	GA 32.08	0.434	0.446	0.489	0.530	0.517	0.502	0.498	0.492	0.480	0.528	0.517	0.462
BARBERS POINT	HI 21.19	0.508	0.519	0.524	0.539	0.562	0.573	0.577	0.584	0.583	0.567	0.550	0.529
HILLO	HI 19.43	0.457	0.440	0.425	0.421	0.445	0.474	0.467	0.472	0.492	0.490	0.453	0.444
HONOLULU	HI 21.20	0.497	0.503	0.517	0.528	0.556	0.568	0.572	0.583	0.582	0.562	0.536	0.514
LIHOE	HI 21.59	0.471	0.473	0.472	0.482	0.519	0.527	0.531	0.539	0.562	0.533	0.495	0.485

LOCATION	LAT. (DEG.MIN)	LAT.											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
BURLINGTON	44 42.47	0.423	0.444	0.455	0.463	0.525	0.570	0.584	0.579	0.556	0.558	0.489	0.416
DES MOINES	41 41.32	0.437	0.454	0.466	0.492	0.523	0.571	0.587	0.582	0.569	0.573	0.500	0.437
MASSON CITY	43 43.09	0.446	0.461	0.473	0.485	0.532	0.568	0.585	0.590	0.571	0.567	0.488	0.432
SIoux CITY	42 42.24	0.444	0.454	0.468	0.531	0.533	0.571	0.595	0.590	0.571	0.570	0.506	0.440
BOISE	43 43.34	0.393	0.448	0.532	0.585	0.640	0.662	0.734	0.709	0.711	0.666	0.520	0.435
LEWISTON	46 46.23	0.319	0.369	0.436	0.470	0.521	0.542	0.660	0.637	0.616	0.531	0.392	0.336
POCATULLO	42 42.55	0.430	0.483	0.553	0.591	0.640	0.667	0.730	0.719	0.717	0.671	0.554	0.459
CHICAGO	41 41.47	0.365	0.403	0.439	0.462	0.501	0.540	0.545	0.548	0.539	0.524	0.434	0.365
MOLINE	41 41.27	0.401	0.427	0.441	0.461	0.491	0.530	0.543	0.545	0.538	0.533	0.450	0.387
SPRINGFIELD	39 39.50	0.411	0.435	0.440	0.473	0.521	0.564	0.575	0.568	0.563	0.549	0.480	0.406
EVANSVILLE	38 38.03	0.378	0.398	0.432	0.464	0.497	0.534	0.536	0.541	0.530	0.535	0.453	0.382
FORT WAYNE	41 41.00	0.335	0.363	0.385	0.428	0.468	0.495	0.500	0.505	0.501	0.489	0.383	0.323
INDIANAPOLIS	39 39.44	0.347	0.376	0.399	0.437	0.472	0.503	0.505	0.517	0.512	0.501	0.409	0.343
SOUTH BEND	41 41.42	0.315	0.349	0.393	0.434	0.482	0.517	0.519	0.531	0.513	0.490	0.380	0.308
DODGE CITY	37 37.46	0.539	0.540	0.553	0.582	0.583	0.636	0.639	0.635	0.636	0.587	0.553	0.553
GODDARD	39 39.22	0.546	0.527	0.545	0.570	0.576	0.634	0.642	0.631	0.644	0.597	0.553	0.553
YORK	39 39.04	0.465	0.466	0.474	0.511	0.535	0.573	0.598	0.581	0.578	0.532	0.467	0.467
WICHITA	37 37.39	0.509	0.508	0.525	0.550	0.568	0.611	0.625	0.632	0.607	0.609	0.570	0.519
LEXINGTON	38 38.02	0.359	0.377	0.413	0.457	0.487	0.511	0.517	0.525	0.514	0.514	0.436	0.371
LOUISVILLE	38 38.11	0.361	0.383	0.415	0.454	0.480	0.513	0.513	0.524	0.515	0.514	0.435	0.375
BATON ROUGE	30 30.32	0.410	0.438	0.475	0.503	0.522	0.527	0.488	0.506	0.507	0.548	0.483	0.429
LAKE CHARLES	30 30.07	0.376	0.416	0.450	0.469	0.517	0.539	0.500	0.499	0.512	0.577	0.476	0.405
NEW ORLEANS	29 29.59	0.429	0.457	0.484	0.532	0.550	0.549	0.508	0.517	0.522	0.557	0.503	0.450
SHREVEPORT	32 32.28	0.420	0.447	0.471	0.486	0.526	0.562	0.562	0.570	0.549	0.569	0.515	0.453
BOSTON	42 42.22	0.370	0.383	0.407	0.421	0.454	0.488	0.491	0.476	0.506	0.488	0.395	0.377
BALTIMORE	39 39.11	0.403	0.418	0.443	0.463	0.478	0.506	0.504	0.502	0.510	0.504	0.457	0.431
PATUXENT RIVER	38 38.17	0.404	0.420	0.445	0.476	0.492	0.510	0.507	0.508	0.514	0.505	0.473	0.415
BANTRY	42 42.48	0.395	0.419	0.455	0.466	0.487	0.499	0.524	0.525	0.524	0.494	0.413	0.364
CARIBOU	46 46.52	0.404	0.445	0.489	0.465	0.447	0.473	0.499	0.467	0.477	0.432	0.356	0.376
PORTLAND	43 43.39	0.371	0.381	0.396	0.418	0.440	0.460	0.466	0.472	0.475	0.468	0.382	0.363
ALBANY	42 42.04	0.319	0.359	0.430	0.456	0.485	0.505	0.531	0.517	0.485	0.441	0.339	0.292
DETROIT	42 42.25	0.326	0.367	0.400	0.445	0.481	0.502	0.515	0.504	0.504	0.482	0.376	0.322
FLINT	42 42.58	0.306	0.349	0.386	0.427	0.465	0.487	0.505	0.530	0.485	0.463	0.346	0.298
GRAND RAPIDS	42 42.53	0.294	0.354	0.409	0.450	0.493	0.526	0.537	0.538	0.511	0.478	0.356	0.298
HUGHES	37 37.10	0.239	0.301	0.405	0.450	0.470	0.494	0.521	0.505	0.440	0.425	0.288	0.237
SAULT STE. MARIE	46 46.28	0.306	0.367	0.441	0.453	0.477	0.487	0.519	0.502	0.451	0.417	0.316	0.299
TRAVERSE CITY	44 44.44	0.269	0.327	0.416	0.454	0.487	0.514	0.538	0.524	0.488	0.463	0.329	0.273
DULUTH	46 46.50	0.173	0.414	0.444	0.451	0.465	0.479	0.525	0.512	0.474	0.455	0.373	0.353
INTERNATIONAL FALLS	48 48.34	0.376	0.431	0.466	0.482	0.488	0.499	0.546	0.543	0.501	0.468	0.369	0.370
MINNEAPOLIS-ST. PAUL	44 44.53	0.405	0.442	0.460	0.467	0.489	0.518	0.555	0.550	0.525	0.507	0.423	0.379
ROCHESTER	43 43.55	0.399	0.424	0.444	0.453	0.477	0.511	0.537	0.538	0.515	0.499	0.416	0.376
COLUMBIA	38 38.40	0.414	0.431	0.448	0.474	0.525	0.563	0.591	0.588	0.553	0.552	0.487	0.413
KANSAS CITY	39 39.18	0.447	0.445	0.460	0.491	0.523	0.560	0.587	0.584	0.558	0.554	0.512	0.456
SPRINGFIELD	37 37.14	0.438	0.443	0.459	0.494	0.525	0.560	0.576	0.581	0.553	0.552	0.500	0.446
ST. LOUIS	38 38.45	0.424	0.436	0.457	0.486	0.522	0.564	0.572	0.568	0.556	0.550	0.489	0.418
JACKSON	32 32.19	0.413	0.440	0.480	0.514	0.541	0.551	0.533	0.540	0.532	0.554	0.498	0.437
MERIDIAN	32 32.20	0.408	0.435	0.466	0.530	0.518	0.534	0.509	0.528	0.513	0.548	0.495	0.432
BILLINGS	45 45.48	0.443	0.454	0.504	0.497	0.540	0.585	0.673	0.664	0.625	0.599	0.517	0.477
CUT BANK	48 48.28	0.426	0.448	0.503	0.496	0.536	0.551	0.650	0.637	0.604	0.580	0.514	0.456
DILLON	45 45.15	0.467	0.495	0.537	0.532	0.561	0.576	0.675	0.661	0.640	0.611	0.539	0.493
GLASSBORO	40 40.13	0.402	0.432	0.489	0.495	0.519	0.551	0.623	0.624	0.595	0.576	0.501	0.444
GARRET FALLS	47 47.29	0.418	0.452	0.511	0.492	0.524	0.566	0.660	0.643	0.604	0.592	0.500	0.424
HELENA	46 46.36	0.398	0.432	0.492	0.488	0.526	0.549	0.660	0.637	0.609	0.577	0.503	0.434
LEWISTOWN	47 47.03	0.408	0.428	0.489	0.476	0.512	0.554	0.648	0.630	0.596	0.572	0.493	0.445
MILES CITY	46 46.26	0.430	0.452	0.507	0.505	0.536	0.577	0.648	0.652	0.620	0.595	0.524	0.470
MISSOULA	46 46.55	0.301	0.354	0.424	0.455	0.505	0.520	0.659	0.673	0.588	0.511	0.400	0.325
ASHVILLE	35 35.26	0.435	0.444	0.475	0.509	0.503	0.502	0.495	0.500	0.497	0.432	0.516	0.453
CAPE HATTERAS	35 35.16	0.411	0.433	0.481	0.511	0.547	0.551	0.536	0.524	0.522	0.526	0.527	0.451
CHARLOTTE	35 35.13	0.430	0.442	0.477	0.517	0.517	0.520	0.511	0.521	0.516	0.542	0.522	0.460
CHERRY POINT	34 34.54	0.449	0.463	0.501	0.546	0.536	0.525	0.510	0.501	0.518	0.537	0.541	0.485
GREENSBORO	36 36.05	0.440	0.441	0.481	0.515	0.520	0.528	0.520	0.523	0.522	0.537	0.521	0.445
RALIGH-DURHAM	35 35.52	0.424	0.435	0.466	0.503	0.504	0.504	0.495	0.494	0.506	0.518	0.500	0.445
BISMARCK	46 46.46	0.447	0.476	0.503	0.479	0.523	0.554	0.618	0.621	0.585	0.568	0.491	0.449
FARGO	46 46.54	0.403	0.435	0.474	0.485	0.519	0.536	0.600	0.604	0.565	0.549	0.466	0.409
MINY	48 48.16	0.399	0.423	0.463	0.486	0.522	0.532	0.596	0.603	0.567	0.558	0.465	0.413
GRAND ISLAND	40 40.58	0.486	0.477	0.495	0.533	0.572	0.603	0.620	0.615	0.594	0.602	0.548	0.497
NORTH DAKOTA	41 41.22	0.474	0.468	0.482	0.492	0.524	0.571	0.590	0.591	0.562	0.561	0.485	0.455
NORTH PLATTE	41 41.08	0.512	0.500	0.523	0.543	0.556	0.610	0.638	0.631	0.617	0.625	0.567	0.532
SCOTTSDALE	41 41.52	0.515	0.506	0.519	0.528	0.542	0.601	0.640	0.638	0.637	0.620	0.556	0.524
CONCORD	43 43.12	0.371	0.378	0.395	0.421	0.444	0.458	0.470	0.468	0.464	0.459	0.377	0.354
LAKENHURST	40 40.32	0.397	0.424	0.428	0.456	0.467	0.478	0.476	0.473	0.484	0.493	0.444	0.397
NEWARK	40 40.42	0.401	0.404	0.432	0.455	0.472	0.483	0.493	0.495	0.499	0.499	0.437	0.391
ALBUQUERQUE	35 35.03	0.605	0.608	0.639	0.679	0.707	0.725	0.694	0.703	0.717	0.712	0.680	0.630
CLAYTON	36 36.27	0.599	0.579	0.608	0.625	0.614	0.653	0.637	0.648	0.667	0.680	0.646	0.617
FARMINGTON	36 36.45	0.595	0.602	0.625	0.655	0.683	0.720	0.691	0.697	0.718	0.706	0.684	0.607
ROSELLE	33 33.24	0.592	0.602	0.641	0.671	0.685	0.709	0.681	0.683	0.683	0.678	0.645	0.609
TRUTH OR CONSEQUENCE	33 33.14	0.635	0.634	0.668	0.706	0.713	0.720	0.660	0.675	0.691	0.700	0.690	0.638
TUCUMCARI	35 35.11	0.603	0.604	0.620	0.640	0.645	0.672	0.655	0.665	0.667	0.666	0.646	0.621
LOVE	35 35.06	0.585	0.588	0.611	0.660	0.689	0.704	0.632	0.638	0.690	0.689	0.654	0.608
ELK	40 40.50	0.504	0.536	0.572	0.597	0.644	0.681	0.734	0.733	0.743	0.697	0.599	0.533
ELY	39 39.17	0.565	0.569	0.614	0.626	0.645	0.677	0.684	0.700	0.743	0.713	0.643	0.583
LAS VEGAS	36 36.05	0.602	0.620	0.668	0.710	0.737	0.751	0.722	0.726	0.750	0.725	0.673	0.622
LOVELL	40 40.04	0.571	0.592	0.640	0.678	0.714	0.740	0.779	0.783	0.787	0.75		

		LAT.												
LOCATION		(DEG.MN) JAN FEB MAR APR MAY JUN JUL AUG SEPT OCT NOV DEC												
YUCCA FLATS	NY	38.57	0.604	0.601	0.651	0.691	0.718	0.718	0.750	0.738	0.753	0.777	0.805	0.828
ALBANY	NY	42.45	0.361	0.375	0.397	0.425	0.440	0.465	0.484	0.481	0.473	0.453	0.423	0.389
BINGHAMTON	NY	42.19	0.299	0.304	0.344	0.394	0.419	0.452	0.465	0.453	0.453	0.426	0.383	0.276
BUFFALO	NY	42.38	0.278	0.299	0.359	0.419	0.444	0.483	0.493	0.483	0.467	0.437	0.383	0.271
NASSAU	NY	44.56	0.362	0.360	0.408	0.435	0.455	0.478	0.493	0.484	0.470	0.435	0.382	0.316
CENTRAL PARK	NY	43.47	0.365	0.373	0.405	0.429	0.458	0.460	0.472	0.477	0.476	0.471	0.392	0.369
LA GUARDIA	NY	40.54	0.399	0.411	0.438	0.458	0.473	0.483	0.499	0.501	0.502	0.500	0.436	0.383
ROCHESTER	NY	43.07	0.293	0.308	0.366	0.428	0.451	0.488	0.500	0.489	0.471	0.438	0.324	0.273
SYRACUSE	NY	43.07	0.313	0.316	0.360	0.423	0.443	0.478	0.494	0.484	0.474	0.436	0.324	0.277
ARLINGTON	OH	40.55	0.314	0.337	0.377	0.427	0.467	0.495	0.500	0.506	0.500	0.479	0.373	0.327
CINCINNATI	OH	39.04	0.342	0.366	0.391	0.435	0.467	0.495	0.495	0.512	0.502	0.499	0.405	0.346
CLEVELAND	OH	41.29	0.291	0.316	0.363	0.426	0.471	0.496	0.512	0.503	0.491	0.464	0.352	0.283
COLUMBUS	OH	40.09	0.325	0.353	0.378	0.423	0.460	0.488	0.491	0.517	0.497	0.488	0.385	0.323
DAYTON	OH	39.54	0.365	0.367	0.395	0.439	0.475	0.504	0.506	0.518	0.510	0.499	0.401	0.338
TOLEDO	OH	41.36	0.328	0.359	0.394	0.437	0.481	0.505	0.518	0.514	0.506	0.490	0.379	0.320
YOUNGSTOWN	OH	41.18	0.287	0.307	0.350	0.413	0.454	0.473	0.486	0.478	0.472	0.456	0.363	0.279
OKLAHOMA CITY	OK	35.24	0.482	0.482	0.509	0.526	0.534	0.563	0.594	0.600	0.568	0.572	0.547	0.499
TULSA	OK	36.12	0.452	0.454	0.475	0.491	0.508	0.546	0.566	0.576	0.543	0.549	0.515	0.468
ASTORIA	OR	46.29	0.282	0.278	0.269	0.260	0.254	0.247	0.244	0.243	0.240	0.236	0.233	0.230
BURNS	OR	43.35	0.407	0.442	0.484	0.577	0.613	0.691	0.672	0.663	0.592	0.442	0.424	0.424
MEDFORD	OR	42.22	0.317	0.398	0.453	0.521	0.570	0.612	0.694	0.678	0.638	0.539	0.396	0.315
NORTH BEND	OR	43.25	0.354	0.351	0.353	0.352	0.352	0.356	0.352	0.352	0.352	0.352	0.352	0.352
REDFORD	OR	44.41	0.316	0.364	0.441	0.489	0.543	0.577	0.676	0.654	0.637	0.549	0.401	0.333
PORTLAND	OR	45.36	0.283	0.324	0.378	0.428	0.469	0.477	0.575	0.548	0.515	0.436	0.353	0.291
REDWOOD	OR	44.16	0.316	0.441	0.441	0.362	0.385	0.415	0.609	0.671	0.656	0.579	0.480	0.440
SALMON	OR	44.55	0.293	0.341	0.385	0.444	0.460	0.497	0.604	0.578	0.556	0.454	0.362	0.288
ALBANY	PA	40.39	0.383	0.394	0.420	0.443	0.458	0.478	0.494	0.489	0.485	0.486	0.416	0.373
PHILADELPHIA	PA	40.05	0.266	0.309	0.366	0.431	0.461	0.496	0.514	0.480	0.480	0.451	0.323	0.256
HARRISBURG	PA	40.13	0.382	0.393	0.418	0.442	0.462	0.486	0.493	0.489	0.483	0.485	0.417	0.377
PITTSBURGH	PA	39.53	0.391	0.402	0.427	0.448	0.464	0.487	0.492	0.496	0.496	0.497	0.440	0.390
WILKES-BARRE-SCHENAPPA	PA	40.33	0.326	0.321	0.367	0.413	0.445	0.474	0.473	0.477	0.472	0.468	0.367	0.296
WILKES-BARRE-SCHENAPPA	PA	41.23	0.343	0.361	0.390	0.422	0.445	0.473	0.489	0.481	0.474	0.478	0.384	0.327
PROVIDENCE	RI	41.44	0.384	0.391	0.409	0.435	0.444	0.477	0.475	0.477	0.481	0.489	0.411	0.379
CHARLESTON	SC	32.54	0.415	0.432	0.472	0.523	0.518	0.501	0.502	0.482	0.495	0.489	0.411	0.379
COLUMBIA	SC	33.57	0.438	0.452	0.484	0.524	0.528	0.528	0.514	0.520	0.517	0.515	0.434	0.377
GREENVILLE-SPARTANBURG	SC	34.54	0.432	0.444	0.480	0.517	0.512	0.519	0.511	0.521	0.510	0.541	0.456	0.393
MURKIN	SD	44.23	0.416	0.425	0.460	0.493	0.527	0.565	0.615	0.614	0.588	0.575	0.496	0.422
PITTSBURGH	SD	44.23	0.451	0.454	0.499	0.520	0.553	0.560	0.641	0.647	0.621	0.611	0.535	0.467
RAPID CITY	SD	44.03	0.455	0.467	0.505	0.511	0.531	0.573	0.625	0.635	0.626	0.612	0.547	0.487
ST. PAUL	SD	43.35	0.437	0.447	0.470	0.494	0.512	0.564	0.604	0.595	0.577	0.571	0.501	0.439
CHATTANOOGA	TN	35.32	0.375	0.389	0.425	0.482	0.496	0.484	0.500	0.486	0.510	0.486	0.394	0.344
KNOXVILLE	TN	35.49	0.370	0.398	0.435	0.499	0.502	0.514	0.503	0.513	0.508	0.524	0.467	0.398
MEMPHIS	TN	35.23	0.407	0.428	0.462	0.499	0.525	0.553	0.550	0.560	0.535	0.554	0.492	0.427
NASHVILLE	TN	36.07	0.357	0.382	0.414	0.473	0.508	0.530	0.528	0.536	0.515	0.525	0.442	0.368
ABILEE	TX	32.26	0.508	0.509	0.553	0.555	0.568	0.601	0.547	0.594	0.564	0.574	0.558	0.535
AMARILLO	TX	32.14	0.575	0.566	0.591	0.616	0.616	0.657	0.636	0.656	0.642	0.648	0.623	0.596
AUSTIN	TX	30.18	0.448	0.465	0.491	0.512	0.567	0.589	0.582	0.555	0.578	0.515	0.477	0.427
BROWNSVILLE	TX	28.54	0.424	0.437	0.481	0.514	0.542	0.587	0.624	0.604	0.563	0.561	0.493	0.439
CORPUS CHRISTI	TX	27.46	0.436	0.454	0.479	0.488	0.523	0.577	0.614	0.596	0.569	0.569	0.510	0.452
SAN ANTONIO	TX	29.51	0.458	0.464	0.501	0.531	0.526	0.580	0.592	0.593	0.563	0.562	0.525	0.470
DEL RIO	TX	29.22	0.485	0.491	0.537	0.537	0.511	0.555	0.576	0.582	0.543	0.561	0.539	0.507
EL PASO	TX	31.48	0.609	0.629	0.666	0.710	0.725	0.731	0.685	0.692	0.697	0.707	0.677	0.623
EL PASO	TX	32.53	0.448	0.463	0.497	0.488	0.527	0.585	0.602	0.603	0.575	0.569	0.526	0.481
HOUSTON	TX	29.59	0.397	0.425	0.444	0.455	0.496	0.523	0.512	0.508	0.507	0.532	0.478	0.417
KINGSVILLE	TX	27.41	0.451	0.458	0.487	0.493	0.523	0.562	0.553	0.575	0.547	0.556	0.503	0.452
LARDO	TX	27.32	0.463	0.472	0.507	0.512	0.547	0.572	0.594	0.601	0.574	0.563	0.506	0.473
LUBBOCK	TX	32.39	0.588	0.586	0.627	0.656	0.668	0.690	0.673	0.674	0.652	0.656	0.641	0.603
LUFKIN	TX	31.16	0.422	0.450	0.477	0.487	0.521	0.561	0.561	0.563	0.534	0.575	0.510	0.457
MIDLAND-DRESSER	TX	31.76	0.586	0.589	0.647	0.659	0.678	0.698	0.667	0.670	0.648	0.658	0.642	0.608
PORT ARTHUR	TX	29.57	0.411	0.440	0.463	0.481	0.523	0.551	0.517	0.523	0.526	0.551	0.493	0.431
SAN ANTONIO	TX	31.22	0.411	0.409	0.457	0.555	0.567	0.596	0.593	0.594	0.561	0.572	0.501	0.435
SAN ANTONIO	TX	29.32	0.455	0.471	0.494	0.481	0.533	0.567	0.594	0.585	0.562	0.556	0.516	0.478
SHERMAN	TX	33.43	0.454	0.457	0.486	0.488	0.516	0.574	0.580	0.589	0.566	0.568	0.529	0.481
WACO	TX	31.37	0.448	0.466	0.497	0.484	0.495	0.576	0.594	0.591	0.561	0.559	0.518	0.486
WICHITA FALLS	TX	33.44	0.496	0.498	0.526	0.534	0.562	0.602	0.604	0.601	0.575	0.581	0.555	0.522
BRUCE CANYON	UT	37.42	0.554	0.493	0.630	0.658	0.684	0.716	0.677	0.671	0.722	0.715	0.666	0.617
CEDE CITY	UT	37.42	0.576	0.566	0.612	0.666	0.688	0.732	0.699	0.697	0.760	0.712	0.651	0.592
SALT LAKE CITY	UT	40.46	0.466	0.511	0.568	0.595	0.601	0.689	0.725	0.713	0.723	0.680	0.583	0.492
NORFOLK	VA	36.54	0.429	0.439	0.474	0.515	0.526	0.540	0.517	0.520	0.519	0.519	0.517	0.455
RICHMOND	VA	37.30	0.408	0.419	0.451	0.493	0.491	0.505	0.495	0.497	0.505	0.502	0.477	0.424
ROANOKE	VA	37.19	0.424	0.428	0.460	0.487	0.492	0.508	0.501	0.503	0.508	0.523	0.494	0.439
BURLINGTON	VT	44.28	0.330	0.347	0.389	0.418	0.443	0.465	0.485	0.479	0.466	0.432	0.323	0.297
OLYMPIA	WA	46.58	0.263	0.310	0.365	0.413	0.462	0.456	0.542	0.513	0.502	0.401	0.332	0.270
SEATTLE-YACOMA	WA	47.27	0.263	0.310	0.371	0.427	0.486	0.485	0.637	0.538	0.502	0.420	0.338	0.256
SPokane	WA	47.38	0.316	0.382	0.456	0.495	0.544	0.561	0.669	0.647	0.630	0.561	0.403	0.325
WHIDDEY ISLAND	WA	48.21	0.292	0.344	0.407	0.468	0.500	0.490	0.563	0.514	0.522	0.432	0.376	0.312
YAKIMA	WA	46.34	0.346	0.406	0.482	0.524	0.568	0.583	0.667	0.652	0.636	0.554	0.425	0.350
EAU CLAIRE	WI	44.52	0.354	0.432	0.454	0.451	0.474	0.503	0.532	0.528	0.500	0.487	0.396	0.365
GREEN BAY	WI	44.24	0.386	0.415	0.457	0.464	0.484	0.513	0.532	0.527	0.506	0.478	0.402	0.357
LA CROSSE	WI	43.52	0.400	0.430	0.451	0.458	0.482	0.512	0.515	0.510	0.511	0.484	0.415	0.374
MADISON	WI	43.08	0.415	0.443	0.460	0.447	0.489	0.524	0.543	0.549	0			

## APPENDIX C

### AVERAGE DAILY SOLAR INSOLATION DATA BY MONTH AND ANNUAL TOTALS FOR 235 LOCALITIES

The following tables contain average daily insolation estimates and annual totals for south-facing surfaces at tilt angles from 0 to 90 degrees for 235 localities in the United States. The intermediate angles are provided to facilitate interpolation. The average ground reflectivity assumed is 0.20. Each array tilt angle has 12 estimates associated with it -- one for each month -- plus the total annual amount. The average daily amount for the entire year is computed by dividing the annual total by 365. The values within the tables are in units of kilowatt hours per square meter. Localities are listed in alphabetical order by state and then by city within the state.

The tables were printed using an IBM 3800 laser printer.

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ADAK  
AK  
LATITUDE: 51 DEGREES 53 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.73	1.36	2.25	3.25	3.72	3.72	3.72	2.99	2.39	1.66	0.97	0.59	827.7	2.3
10.0	0.90	1.56	2.47	3.40	3.79	3.76	3.60	3.12	2.63	1.98	1.28	0.79	892.2	2.4
15.0	0.98	1.66	2.55	3.46	3.80	3.76	3.60	3.17	2.72	2.12	1.43	0.89	917.8	2.5
20.0	1.05	1.74	2.63	3.49	3.80	3.73	3.60	3.19	2.80	2.25	1.57	0.98	938.9	2.6
25.0	1.12	1.81	2.69	3.51	3.77	3.69	3.57	3.20	2.87	2.37	1.70	1.07	955.4	2.6
30.0	1.18	1.87	2.73	3.51	3.73	3.64	3.53	3.20	2.92	2.47	1.82	1.15	966.9	2.6
35.0	1.24	1.92	2.76	3.49	3.67	3.57	3.48	3.18	2.96	2.56	1.92	1.22	973.4	2.7
40.0	1.29	1.97	2.78	3.45	3.60	3.48	3.40	3.14	2.98	2.63	2.02	1.28	974.8	2.7
45.0	1.33	2.00	2.78	3.40	3.50	3.38	3.31	3.09	2.98	2.69	2.10	1.34	971.1	2.7
50.0	1.36	2.02	2.77	3.33	3.39	3.27	3.21	3.03	2.97	2.73	2.17	1.38	962.3	2.6
60.0	1.40	2.02	2.70	3.14	3.14	3.01	2.97	2.86	2.90	2.76	2.26	1.45	931.4	2.6
70.0	1.41	1.98	2.57	2.90	2.84	2.70	2.69	2.63	2.76	2.73	2.29	1.48	881.8	2.4
80.0	1.38	1.89	2.39	2.60	2.49	2.36	2.36	2.37	2.57	2.63	2.27	1.48	814.5	2.2
90.0	1.32	1.77	2.16	2.26	2.12	2.01	2.01	2.06	2.32	2.46	2.18	1.43	732.8	2.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ANNETTE  
AK  
LATITUDE: 55 DEGREES 2 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	0.56	1.18	2.26	3.62	4.64	4.62	4.54	3.66	2.56	1.33	0.69	0.39	916.0	2.5
10.0	0.80	1.38	2.51	3.85	4.78	4.70	4.67	3.90	2.83	1.60	0.94	0.60	994.7	2.7
15.0	0.91	1.47	2.62	3.93	4.82	4.71	4.71	3.98	3.01	1.72	1.06	0.71	1026.3	2.8
20.0	1.01	1.56	2.72	4.00	4.83	4.70	4.71	4.05	3.13	1.84	1.18	0.80	1052.4	2.9
25.0	1.11	1.63	2.80	4.04	4.82	4.66	4.70	4.09	3.24	1.94	1.28	0.90	1073.3	2.9
30.0	1.20	1.70	2.86	4.05	4.79	4.61	4.67	4.11	3.32	2.04	1.38	0.98	1088.6	3.0
35.0	1.29	1.75	2.91	4.05	4.73	4.53	4.61	4.11	3.38	2.12	1.47	1.07	1097.9	3.0
40.0	1.36	1.80	2.95	4.03	4.64	4.43	4.53	4.08	3.43	2.18	1.55	1.14	1101.2	3.0
45.0	1.43	1.84	2.96	3.98	4.54	4.31	4.42	4.04	3.45	2.24	1.63	1.20	1098.3	3.0
50.0	1.49	1.86	2.96	3.91	4.40	4.17	4.26	3.97	3.46	2.28	1.69	1.26	1089.4	3.0
60.0	1.57	1.88	2.91	3.72	4.09	3.84	3.98	3.77	3.41	2.32	1.77	1.35	1055.2	2.9
70.0	1.61	1.86	2.80	3.46	3.71	3.46	3.51	3.50	3.28	2.31	1.81	1.40	999.7	2.7
80.0	1.61	1.79	2.62	3.12	3.26	3.01	3.18	3.17	3.08	2.23	1.80	1.41	922.9	2.5
90.0	1.56	1.69	2.39	2.73	2.76	2.54	2.69	2.77	2.81	2.11	1.75	1.39	827.7	2.3

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BETHEL AK.  
LATITUDE: 60 DEGREES 47 MINUTES

## AVERAGE DAILY HOURS BY MONTH

ARRAY FILT	AVERAGE DAILY HOURS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.31	1.00	2.33	3.79	4.58	4.79	4.77	2.90	2.21	1.17	0.43	0.15	845.0	2.3
10.0	0.45	1.27	2.72	4.11	4.76	4.91	4.22	3.10	2.56	1.54	0.72	0.28	933.6	2.6
15.0	0.52	1.40	2.89	4.23	4.82	4.94	4.26	3.15	2.71	1.72	0.86	0.34	970.9	2.7
20.0	0.59	1.52	3.05	4.34	4.85	4.94	4.28	3.24	2.85	1.88	0.99	0.39	1003.0	2.7
25.0	0.65	1.62	3.19	4.42	4.86	4.92	4.28	3.28	2.98	2.04	1.12	0.45	1029.6	2.8
30.0	0.71	1.72	3.31	4.47	4.85	4.88	4.26	3.31	3.08	2.18	1.24	0.50	1051.0	2.9
35.0	0.77	1.81	3.41	4.50	4.81	4.82	4.23	3.32	3.17	2.30	1.35	0.55	1067.0	2.9
40.0	0.82	1.89	3.49	4.51	4.75	4.74	4.17	3.31	3.24	2.42	1.45	0.59	1077.0	3.0
45.0	0.86	1.96	3.54	4.49	4.67	4.64	4.09	3.28	3.29	2.51	1.54	0.64	1080.9	3.0
50.0	0.90	2.01	3.58	4.44	4.56	4.51	4.00	3.24	3.32	2.59	1.62	0.67	1078.6	3.5
60.0	0.96	2.08	3.59	4.27	4.27	4.18	3.74	3.10	3.32	2.70	1.75	0.73	1055.8	2.9
70.0	0.99	2.10	3.51	4.02	3.92	3.81	3.43	2.91	3.24	2.74	1.83	0.77	1012.4	2.8
80.0	1.00	2.06	3.35	3.69	3.50	3.37	3.07	2.67	3.08	2.70	1.86	0.79	946.8	2.6
90.0	0.98	1.98	3.10	3.27	3.02	2.88	2.65	2.37	2.85	2.60	1.83	0.78	860.8	2.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: JUNEAU  
AK  
LATITUDE: 58 DEGREES 22 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.37	0.89	1.92	3.30	4.07	4.46	4.03	3.13	2.01	1.01	0.47	0.19	787.4	2.2
10.0	0.55	1.13	2.15	3.52	4.20	4.55	4.16	3.30	2.26	1.23	0.68	0.32	855.6	2.3
15.0	0.64	1.24	2.25	3.61	4.24	4.57	4.20	3.38	2.37	1.33	0.78	0.38	883.4	2.4
20.0	0.72	1.34	2.34	3.68	4.25	4.56	4.21	3.44	2.47	1.42	0.88	0.44	906.5	2.5
25.0	0.80	1.43	2.41	3.72	4.25	4.54	4.20	3.48	2.55	1.51	0.97	0.50	924.9	2.5
30.0	0.87	1.52	2.47	3.75	4.22	4.49	4.18	3.50	2.62	1.59	1.05	0.56	938.9	2.6
35.0	0.94	1.59	2.52	3.76	4.18	4.43	4.14	3.50	2.67	1.65	1.13	0.61	948.0	2.6
40.0	1.00	1.66	2.56	3.74	4.12	4.34	4.07	3.49	2.71	1.71	1.20	0.65	952.0	2.6
45.0	1.06	1.71	2.58	3.71	4.03	4.24	3.99	3.45	2.73	1.76	1.27	0.69	950.8	2.6
50.0	1.10	1.76	2.59	3.66	3.93	4.11	3.88	3.40	2.74	1.80	1.32	0.73	944.4	2.6
60.0	1.18	1.81	2.56	3.49	3.66	3.80	3.62	3.25	2.71	1.84	1.40	0.79	916.7	2.5
70.0	1.22	1.82	2.47	3.27	3.35	3.45	3.31	3.04	2.62	1.84	1.45	0.82	872.0	2.4
80.0	1.22	1.79	2.33	2.93	2.98	3.04	2.94	2.77	2.47	1.79	1.45	0.84	808.9	2.2
90.0	1.20	1.70	2.14	2.63	2.56	2.58	2.52	2.44	2.27	1.70	1.42	0.83	729.7	2.0



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: KING SALMON AK  
LATITUDE: 58 DEGREES 41 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.46	1.19	2.51	3.80	4.67	4.85	4.36	3.29	2.45	1.49	0.64	0.28	915.2	2.5
10.0	0.68	1.49	2.90	4.10	4.85	4.96	4.51	3.52	2.82	1.95	1.03	0.50	1015.4	2.8
15.0	0.78	1.63	3.07	4.21	4.90	4.99	4.56	3.61	2.98	2.17	1.21	0.60	1057.6	2.9
20.0	0.88	1.76	3.23	4.30	4.92	4.99	4.57	3.68	3.12	2.37	1.39	0.70	1094.0	3.0
25.0	0.97	1.88	3.36	4.37	4.92	4.96	4.57	3.73	3.25	2.55	1.56	0.79	1124.4	3.1
30.0	1.05	1.99	3.48	4.41	4.91	4.91	4.55	3.76	3.36	2.72	1.71	0.88	1149.2	3.1
35.0	1.13	2.09	3.57	4.43	4.86	4.85	4.51	3.76	3.44	2.87	1.86	0.96	1167.6	3.2
40.0	1.20	2.17	3.65	4.42	4.79	4.76	4.44	3.75	3.51	3.00	1.99	1.04	1179.4	3.2
45.0	1.27	2.24	3.70	4.39	4.70	4.64	4.35	3.72	3.56	3.12	2.11	1.11	1184.4	3.2
50.0	1.32	2.30	3.73	4.34	4.58	4.50	4.24	3.67	3.58	3.21	2.21	1.17	1182.6	3.2
60.0	1.40	2.37	3.72	4.15	4.27	4.17	3.95	3.51	3.57	3.33	2.38	1.26	1159.1	3.2
70.0	1.45	2.38	3.62	3.89	3.91	3.78	3.62	3.28	3.47	3.37	2.47	1.33	1112.2	3.0
80.0	1.46	2.33	3.43	3.55	3.47	3.32	3.21	2.99	3.28	3.31	2.50	1.35	1040.4	2.9
90.0	1.42	2.22	3.16	3.13	2.97	2.82	2.75	2.64	3.02	3.17	2.45	1.34	945.9	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: KODIAK  
AK  
LATITUDE: 57 DEGREES 45 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	0.47	1.12	2.46	3.81	4.34	4.82	4.44	3.67	2.50	1.56	0.65	0.31	919.0	2.5
10.0	0.66	1.36	2.81	4.09	4.48	4.93	4.59	3.94	2.86	1.99	1.00	0.49	1012.5	2.8
15.0	0.74	1.47	2.97	4.20	4.52	4.95	4.63	4.04	3.02	2.20	1.16	0.52	1051.4	2.9
20.0	0.83	1.58	3.11	4.29	4.54	4.94	4.65	4.12	3.16	2.39	1.32	0.66	1084.5	3.0
25.0	0.91	1.67	3.23	4.35	4.53	4.91	4.64	4.18	3.28	2.57	1.46	0.75	1111.9	3.0
30.0	0.98	1.76	3.33	4.39	4.51	4.86	4.62	4.21	3.38	2.73	1.60	0.82	1133.6	3.1
35.0	1.04	1.83	3.41	4.40	4.46	4.80	4.57	4.22	3.47	2.87	1.73	0.89	1149.1	3.1
40.0	1.10	1.89	3.47	4.39	4.40	4.70	4.50	4.21	3.53	3.00	1.85	0.96	1158.0	3.2
45.0	1.16	1.95	3.52	4.35	4.30	4.59	4.41	4.17	3.57	3.11	1.95	1.01	1160.4	3.2
50.0	1.20	1.99	3.54	4.29	4.19	4.45	4.29	4.12	3.59	3.20	2.04	1.07	1156.2	3.2
60.0	1.27	2.03	3.51	4.11	3.90	4.11	4.00	3.93	3.57	3.31	2.18	1.15	1128.9	3.1
70.0	1.30	2.03	3.41	3.84	3.57	3.72	3.65	3.68	3.46	3.33	2.26	1.20	1078.9	3.0
80.0	1.30	1.97	3.22	3.49	3.16	3.26	3.23	3.34	3.27	3.27	2.27	1.21	1005.0	2.8
90.0	1.27	1.87	2.96	3.08	2.70	2.76	2.76	2.94	3.00	3.12	2.22	1.19	909.7	2.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: NOME  
AK  
LATITUDE: 64 DEGREES 30 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.09	0.71	1.99	3.74	4.96	5.53	4.46	3.13	2.12	0.97	0.20	0.01	851.6	2.3
10.0	0.15	0.93	2.37	4.11	5.20	5.70	4.66	3.40	2.54	1.38	0.43	0.01	942.1	2.6
15.0	0.18	1.04	2.55	4.26	5.28	5.75	4.72	3.51	2.73	1.58	0.54	0.01	930.3	2.7
20.0	0.21	1.13	2.71	4.39	5.34	5.78	4.77	3.61	2.90	1.76	0.65	0.01	1013.8	2.8
25.0	0.24	1.23	2.85	4.49	5.36	5.78	4.79	3.68	3.06	1.94	0.75	0.01	1041.6	2.9
30.0	0.26	1.31	2.97	4.57	5.36	5.74	4.78	3.73	3.19	2.10	0.85	0.01	1063.6	2.9
35.0	0.29	1.39	3.08	4.62	5.35	5.69	4.76	3.77	3.31	2.25	0.94	0.01	1080.5	3.0
40.0	0.31	1.46	3.17	4.65	5.30	5.61	4.72	3.78	3.41	2.38	1.02	0.01	1091.6	3.0
45.0	0.33	1.52	3.24	4.65	5.23	5.51	4.65	3.77	3.49	2.50	1.10	0.01	1096.4	3.0
50.0	0.35	1.57	3.29	4.62	5.13	5.38	4.55	3.74	3.54	2.60	1.17	0.01	1094.9	3.0
60.0	0.37	1.64	3.33	4.49	4.84	5.03	4.29	3.62	3.58	2.75	1.28	0.01	1072.9	2.9
70.0	0.39	1.66	3.29	4.26	4.47	4.60	3.96	3.43	3.54	2.82	1.36	0.01	1028.6	2.8
80.0	0.40	1.65	3.16	3.94	4.03	4.10	3.57	3.16	3.40	2.82	1.39	0.01	963.0	2.6
90.0	0.39	1.59	2.96	3.53	3.51	3.53	3.11	2.84	3.19	2.74	1.39	0.01	876.2	2.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SUMMIT AK

LATITUDE: 63 DEGREES 20 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.17	0.79	2.20	3.91	5.14	5.14	4.44	3.29	2.22	1.09	0.34	0.05	878.3	2.4
10.0	0.33	1.03	2.62	4.28	5.39	5.30	4.63	3.58	2.63	1.52	0.70	0.14	980.4	2.7
15.0	0.41	1.14	2.80	4.43	5.47	5.33	4.69	3.69	2.82	1.73	0.88	0.18	1024.2	2.8
20.0	0.48	1.25	2.98	4.56	5.53	5.35	4.73	3.78	2.99	1.92	1.05	0.22	1062.6	2.9
25.0	0.55	1.34	3.13	4.67	5.55	5.35	4.75	3.86	3.14	2.11	1.21	0.26	1095.0	3.0
30.0	0.61	1.43	3.27	4.75	5.55	5.31	4.74	3.91	3.28	2.27	1.37	0.30	1121.3	3.1
35.0	0.67	1.51	3.38	4.80	5.53	5.25	4.71	3.94	3.39	2.43	1.52	0.33	1142.1	3.1
40.0	0.73	1.58	3.48	4.82	5.48	5.18	4.67	3.95	3.48	2.57	1.65	0.37	1156.6	3.2
45.0	0.78	1.64	3.55	4.81	5.40	5.08	4.59	3.94	3.56	2.69	1.77	0.40	1164.2	3.2
50.0	0.83	1.70	3.60	4.78	5.29	4.95	4.49	3.91	3.61	2.79	1.88	0.43	1165.1	3.2
60.0	0.90	1.76	3.64	4.63	4.98	4.61	4.23	3.77	3.64	2.94	2.06	0.47	1146.4	3.1
70.0	0.95	1.79	3.58	4.38	4.59	4.22	3.89	3.57	3.58	3.01	2.18	0.50	1103.8	3.0
80.0	0.97	1.77	3.44	4.04	4.12	3.75	3.50	3.29	3.43	2.99	2.24	0.52	1037.2	2.8
90.0	0.96	1.70	3.21	3.62	3.57	3.22	3.04	2.94	3.20	2.90	2.23	0.52	947.4	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: YAKUTAT AK  
LATITUDE: 59 DEGREES 31 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.32	0.84	1.96	3.31	4.00	4.23	3.81	2.98	2.00	1.09	0.43	0.16	766.3	2.1
10.0	0.49	1.08	2.23	3.55	4.13	4.32	3.93	3.17	2.26	1.38	0.65	0.29	838.1	2.3
15.0	0.57	1.19	2.34	3.64	4.17	4.34	3.97	3.25	2.38	1.51	0.76	0.35	867.8	2.4
20.0	0.65	1.29	2.45	3.72	4.19	4.34	3.98	3.30	2.48	1.64	0.86	0.41	893.0	2.4
25.0	0.72	1.39	2.54	3.77	4.18	4.31	3.97	3.34	2.57	1.76	0.96	0.46	913.5	2.5
30.0	0.79	1.47	2.61	3.80	4.16	4.27	3.95	3.37	2.65	1.86	1.05	0.52	929.5	2.5
35.0	0.86	1.55	2.67	3.81	4.13	4.24	3.91	3.37	2.71	1.96	1.13	0.57	940.8	2.6
40.0	0.92	1.62	2.72	3.81	4.07	4.14	3.86	3.36	2.76	2.04	1.20	0.61	947.0	2.6
45.0	0.97	1.68	2.75	3.78	3.99	4.04	3.78	3.33	2.79	2.11	1.27	0.66	947.9	2.6
50.0	1.01	1.72	2.76	3.73	3.89	3.92	3.68	3.28	2.80	2.16	1.33	0.69	943.6	2.6
60.0	1.09	1.78	2.74	3.57	3.63	3.63	3.44	3.14	2.78	2.23	1.42	0.75	919.9	2.5
70.0	1.13	1.80	2.66	3.35	3.33	3.31	3.15	2.94	2.70	2.25	1.47	0.79	878.8	2.4
80.0	1.14	1.77	2.52	3.06	2.97	2.92	2.81	2.68	2.55	2.21	1.49	0.81	819.1	2.2
90.0	1.12	1.69	2.32	2.71	2.56	2.50	2.42	2.38	2.35	2.11	1.46	0.80	742.6	2.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BIRMINGHAM  
 AL  
 LATITUDE: 33 DEGREES 34 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.22	3.05	4.08	5.27	5.85	6.05	5.70	5.44	4.58	3.82	2.70	2.09	1548.7	4.2
10.0	2.53	3.34	4.32	5.39	5.83	5.98	5.69	5.56	4.86	4.25	3.13	2.44	1623.5	4.4
15.0	2.66	3.46	4.40	5.40	5.78	5.90	5.63	5.58	4.96	4.43	3.32	2.60	1647.6	4.5
20.0	2.78	3.56	4.45	5.38	5.69	5.79	5.55	5.56	5.03	4.57	3.49	2.74	1662.6	4.6
25.0	2.89	3.64	4.49	5.33	5.57	5.64	5.43	5.51	5.07	4.72	3.64	2.87	1658.3	4.6
30.0	2.97	3.70	4.50	5.26	5.42	5.46	5.29	5.43	5.08	4.82	3.76	2.98	1664.6	4.6
35.0	3.04	3.74	4.48	5.16	5.25	5.26	5.12	5.33	5.07	4.89	3.87	3.07	1652.1	4.5
40.0	3.10	3.76	4.44	5.03	5.06	5.05	4.93	5.19	5.02	4.93	3.95	3.15	1631.5	4.5
45.0	3.13	3.76	4.37	4.87	4.84	4.80	4.72	5.03	4.95	4.94	4.01	3.20	1601.9	4.4
50.0	3.15	3.73	4.28	4.69	4.60	4.54	4.49	4.84	4.85	4.93	4.04	3.24	1563.5	4.3
60.0	3.12	3.62	4.03	4.26	4.05	3.95	3.95	4.39	4.57	4.80	4.03	3.25	1461.4	4.0
70.0	3.03	3.43	3.70	3.74	3.44	3.32	3.36	3.85	4.19	4.57	3.92	3.19	1329.9	3.6
80.0	2.86	3.16	3.29	3.16	2.81	2.66	2.75	3.24	3.71	4.22	3.71	3.05	1175.1	3.2
90.0	2.63	2.83	2.82	2.55	2.17	2.05	2.13	2.60	3.17	3.78	3.42	2.83	1002.9	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MOBILE  
 AL  
 LATITUDE: 30 DEGREES 41 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.61	3.47	4.43	5.43	5.91	5.89	5.41	5.17	4.57	4.10	3.01	2.39	1594.5	4.4
10.0	2.95	3.79	4.64	5.51	5.86	5.80	5.37	5.25	4.80	4.53	3.44	2.76	1665.3	4.6
15.0	3.10	3.91	4.72	5.51	5.79	5.70	5.30	5.25	4.88	4.70	3.63	2.92	1687.0	4.6
20.0	3.22	4.02	4.78	5.48	5.69	5.57	5.21	5.22	4.93	4.85	3.80	3.07	1699.4	4.7
25.0	3.34	4.10	4.81	5.42	5.55	5.42	5.09	5.16	4.96	4.97	3.94	3.20	1702.3	4.7
30.0	3.43	4.16	4.80	5.32	5.39	5.23	4.94	5.07	4.95	5.06	4.06	3.31	1695.7	4.6
35.0	3.50	4.19	4.77	5.21	5.21	5.04	4.78	4.96	4.92	5.12	4.16	3.40	1680.9	4.6
40.0	3.55	4.20	4.72	5.06	5.00	4.81	4.59	4.82	4.86	5.14	4.23	3.47	1657.0	4.5
45.0	3.58	4.19	4.63	4.89	4.77	4.57	4.38	4.66	4.77	5.14	4.28	3.52	1624.0	4.4
50.0	3.59	4.16	4.53	4.69	4.51	4.30	4.15	4.47	4.66	5.11	4.30	3.55	1582.1	4.3
60.0	3.55	4.01	4.24	4.23	3.93	3.70	3.63	4.03	4.36	4.95	4.26	3.55	1473.0	4.0
70.0	3.42	3.78	3.86	3.68	3.31	3.09	3.07	3.51	3.97	4.67	4.12	3.45	1335.9	3.7
80.0	3.22	3.46	3.40	3.06	2.66	2.45	2.50	2.93	3.49	4.29	3.88	3.28	1174.2	3.2
90.0	2.94	3.07	2.88	2.44	2.04	1.88	1.93	2.34	2.95	3.81	3.54	3.03	998.4	2.7

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: MONTGOMERY AL  
 LATITUDE: 32 DEGREES 18 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.37	3.20	4.22	5.46	5.98	6.22	5.80	5.51	4.62	3.98	2.88	2.26	1598.7	4.4
10.0	2.68	3.50	4.45	5.56	5.95	6.13	5.77	5.62	4.89	4.42	3.32	2.64	1672.7	4.6
15.0	2.82	3.62	4.53	5.57	5.89	6.04	5.71	5.63	4.98	4.60	3.52	2.81	1695.9	4.6
20.0	2.94	3.72	4.58	5.55	5.79	5.91	5.62	5.60	5.05	4.75	3.69	2.96	1709.6	4.7
25.0	3.05	3.80	4.61	5.49	5.66	5.76	5.49	5.55	5.08	4.88	3.84	3.09	1713.8	4.7
30.0	3.13	3.86	4.62	5.41	5.51	5.57	5.34	5.46	5.09	4.98	3.97	3.21	1708.3	4.7
35.0	3.20	3.89	4.59	5.30	5.33	5.36	5.16	5.35	5.06	5.05	4.07	3.30	1694.1	4.6
40.0	3.25	3.91	4.55	5.16	5.12	5.12	4.97	5.21	5.01	5.08	4.15	3.38	1671.2	4.6
45.0	3.29	3.90	4.47	4.99	4.89	4.87	4.75	5.04	4.93	5.09	4.20	3.44	1639.0	4.5
50.0	3.30	3.87	4.38	4.80	4.64	4.59	4.50	4.84	4.83	5.07	4.23	3.47	1597.7	4.4
60.0	3.27	3.75	4.11	4.34	4.06	3.96	3.95	4.38	4.53	4.93	4.21	3.48	1489.4	4.1
70.0	3.16	3.54	3.76	3.79	3.43	3.31	3.34	3.82	4.14	4.67	4.09	3.40	1351.8	3.7
80.0	2.98	3.26	3.33	3.18	2.78	2.63	2.71	3.20	3.66	4.30	3.86	3.24	1189.9	3.3
90.0	2.73	2.90	2.84	2.54	2.13	2.00	2.09	2.55	3.11	3.84	3.55	3.00	1012.0	2.8



AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: FORT SMITH AR  
 LATITUDE: 35 DEGREES 20 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.34	3.15	4.13	5.10	6.03	6.58	6.51	5.92	4.73	3.79	2.68	2.15	1617.4	4.4
10.0	2.71	3.49	4.39	5.22	6.03	6.53	6.51	6.09	5.05	4.26	3.15	2.57	1705.7	4.7
15.0	2.88	3.63	4.48	5.24	5.98	6.45	6.46	6.12	5.17	4.46	3.36	2.76	1735.6	4.8
20.0	3.03	3.75	4.55	5.23	5.90	6.33	6.37	6.11	5.26	4.63	3.55	2.93	1755.6	4.8
25.0	3.16	3.85	4.60	5.20	5.79	6.18	6.25	6.08	5.32	4.77	3.71	3.08	1765.6	4.8
30.0	3.27	3.92	4.62	5.13	5.65	5.99	6.09	6.00	5.35	4.89	3.86	3.22	1765.6	4.8
35.0	3.37	3.98	4.61	5.04	5.47	5.77	5.89	5.89	5.35	4.98	3.98	3.34	1755.4	4.8
40.0	3.44	4.01	4.57	4.92	5.28	5.54	5.68	5.76	5.32	5.03	4.08	3.43	1737.0	4.8
45.0	3.49	4.02	4.52	4.78	5.06	5.28	5.44	5.59	5.25	5.06	4.15	3.51	1708.8	4.7
50.0	3.52	4.00	4.43	4.61	4.82	4.99	5.17	5.39	5.16	5.05	4.20	3.56	1671.0	4.6
60.0	3.52	3.90	4.19	4.21	4.26	4.34	4.55	4.90	4.88	4.95	4.21	3.60	1567.6	4.3
70.0	3.43	3.71	3.86	3.72	3.62	3.64	3.85	4.31	4.49	4.73	4.12	3.55	1430.9	3.9
80.0	3.27	3.44	3.45	3.16	2.98	2.93	3.14	3.64	4.00	4.39	3.92	3.41	1268.9	3.5
90.0	3.02	3.09	2.97	2.57	2.30	2.23	2.40	2.91	3.43	3.95	3.63	3.19	1085.5	3.0

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LITTLE ROCK AR  
LATITUDE: 34 DEGREES 44 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.30	3.16	4.13	5.08	6.07	6.64	6.64	5.87	4.78	3.88	2.66	2.12	1617.3	4.4
10.0	2.65	3.49	4.38	5.20	6.07	6.57	6.40	6.02	5.10	4.35	3.11	2.52	1701.8	4.7
15.0	2.80	3.63	4.48	5.22	6.02	6.49	6.35	6.05	5.22	4.55	3.31	2.70	1729.8	4.7
20.0	2.94	3.74	4.54	5.20	5.94	6.37	6.25	6.04	5.31	4.73	3.49	2.86	1748.0	4.8
25.0	3.06	3.84	4.58	5.15	5.82	6.21	6.13	6.00	5.36	4.87	3.65	3.00	1756.3	4.8
30.0	3.17	3.91	4.60	5.10	5.67	6.01	5.97	5.92	5.39	4.99	3.79	3.13	1754.6	4.8
35.0	3.25	3.96	4.59	5.00	5.49	5.79	5.78	5.81	5.38	5.07	3.90	3.24	1743.0	4.8
40.0	3.32	3.99	4.55	4.88	5.29	5.55	5.57	5.67	5.34	5.13	3.99	3.32	1723.2	4.7
45.0	3.36	3.99	4.49	4.74	5.07	5.29	5.33	5.50	5.28	5.15	4.06	3.39	1693.6	4.6
50.0	3.39	3.98	4.40	4.57	4.82	4.99	5.06	5.30	5.18	5.14	4.10	3.44	1654.6	4.5
60.0	3.38	3.87	4.16	4.16	4.25	4.34	4.45	4.81	4.89	5.03	4.10	3.47	1549.2	4.2
70.0	3.29	3.68	3.83	3.67	3.61	3.63	3.76	4.23	4.49	4.80	4.00	3.41	1411.2	3.9
80.0	3.12	3.40	3.41	3.12	2.96	2.90	3.06	3.56	4.00	4.45	3.81	3.27	1248.6	3.4
90.0	2.88	3.05	2.93	2.53	2.28	2.20	2.34	2.85	3.42	4.00	3.52	3.05	1065.8	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PHOENIX  
AZ  
LATITUDE: 33 DEGREES 26 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.22	4.34	5.72	7.42	8.44	8.64	7.84	7.23	6.35	4.97	3.63	2.94	2153.9	5.9
10.0	3.79	4.86	6.13	7.63	8.43	8.53	7.82	7.43	6.85	5.65	4.33	3.56	2283.7	6.3
15.0	4.04	5.09	6.28	7.67	8.34	8.40	7.74	7.47	7.03	5.94	4.64	3.85	2327.8	6.4
20.0	4.27	5.28	6.40	7.66	8.20	8.21	7.61	7.45	7.17	6.19	4.93	4.10	2357.7	6.5
25.0	4.47	5.43	6.47	7.60	8.02	7.97	7.44	7.40	7.26	6.40	5.18	4.34	2373.0	6.5
30.0	4.64	5.56	6.51	7.49	7.78	7.69	7.23	7.29	7.31	6.57	5.40	4.54	2373.7	6.5
35.0	4.78	5.65	6.51	7.35	7.50	7.36	6.97	7.15	7.31	6.70	5.58	4.72	2360.6	6.5
40.0	4.90	5.70	6.46	7.16	7.19	7.02	6.69	6.97	7.27	6.78	5.73	4.86	2334.8	6.4
45.0	4.98	5.72	6.38	6.93	6.85	6.63	6.38	6.74	7.18	6.82	5.84	4.97	2294.7	6.3
50.0	5.03	5.71	6.26	6.66	6.46	6.21	6.02	6.48	7.04	6.82	5.91	5.06	2240.5	6.1
60.0	5.04	5.57	5.91	6.00	5.57	5.26	5.22	5.84	6.64	6.68	5.94	5.12	2091.7	5.7
70.0	4.91	5.30	5.41	5.20	4.58	4.26	4.32	5.07	6.08	6.37	5.81	5.05	1895.8	5.2
80.0	4.67	4.90	4.79	4.29	3.58	3.23	3.41	4.18	5.37	5.90	5.53	4.85	1662.2	4.6
90.0	4.30	4.38	4.07	3.34	2.56	2.27	2.49	3.26	4.53	5.28	5.11	4.52	1400.7	3.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PRESCOTT  
AZ  
LATITUDE: 34 DEGREES 39 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.20	4.21	5.60	7.18	8.28	8.71	7.27	6.60	6.16	4.86	3.59	2.92	2088.1	5.7
10.0	3.81	4.74	6.03	7.40	8.29	8.62	7.28	6.79	6.66	5.56	4.34	3.60	2224.9	6.1
15.0	4.08	4.97	6.19	7.44	3.22	8.50	7.21	6.82	6.85	5.86	4.67	3.90	2273.2	6.2
20.0	4.33	5.16	6.31	7.44	8.10	8.32	7.10	6.82	6.99	6.12	4.97	4.18	2307.6	6.3
25.0	4.54	5.33	6.39	7.39	7.92	8.09	6.96	6.77	7.09	6.34	5.24	4.43	2327.9	6.4
30.0	4.73	5.46	6.44	7.30	7.70	7.82	6.77	6.69	7.15	6.52	5.48	4.66	2333.8	6.4
35.0	4.89	5.55	6.45	7.16	7.44	7.49	6.54	6.56	7.16	6.65	5.68	4.85	2325.5	6.4
40.0	5.02	5.62	6.41	6.99	7.15	7.16	6.30	6.41	7.12	6.75	5.85	5.02	2305.4	6.3
45.0	5.12	5.64	6.34	6.78	6.82	6.78	6.01	6.21	7.05	6.80	5.97	5.15	2271.2	6.2
50.0	5.18	5.64	6.23	6.53	6.45	6.36	5.70	5.98	6.92	6.81	6.06	5.24	2223.0	6.1
60.0	5.21	5.52	5.89	5.91	5.60	5.41	4.98	5.42	6.55	6.69	6.11	5.33	2086.6	5.7
70.0	5.10	5.26	5.42	5.15	4.63	4.40	4.16	4.74	6.01	6.40	6.00	5.28	1902.0	5.2
80.0	4.86	4.88	4.82	4.29	3.66	3.37	3.34	3.96	5.33	5.94	5.73	5.08	1680.2	4.6
90.0	4.50	4.38	4.11	3.37	2.66	2.39	2.50	3.13	4.53	5.34	5.31	4.76	1427.4	3.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: TUCSON  
AZ  
LATITUDE: 32 DEGREES 7 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.46	4.52	5.87	7.45	8.43	8.60	7.38	6.88	6.24	5.05	3.80	3.14	2156.0	5.9
10.0	4.05	5.05	6.28	7.64	8.39	8.47	7.34	7.05	6.68	5.71	4.51	3.78	2280.4	6.2
15.0	4.31	5.27	6.42	7.66	8.29	8.32	7.26	7.06	6.84	5.98	4.82	4.07	2322.1	6.4
20.0	4.55	5.45	6.53	7.64	8.14	8.12	7.13	7.04	6.96	6.22	5.10	4.33	2349.5	6.4
25.0	4.76	5.61	6.60	7.57	7.94	7.87	6.96	6.97	7.03	6.41	5.35	4.57	2362.5	6.5
30.0	4.93	5.73	6.63	7.45	7.69	7.58	6.75	6.87	7.07	6.57	5.57	4.78	2361.0	6.5
35.0	5.08	5.82	6.51	7.29	7.41	7.25	6.51	6.72	7.05	6.69	5.75	4.95	2346.5	6.4
40.0	5.19	5.86	6.56	7.09	7.09	6.90	6.24	6.54	7.00	6.76	5.89	5.10	2318.6	6.4
45.0	5.28	5.88	6.47	6.85	6.73	6.50	5.94	6.32	6.90	6.79	5.99	5.21	2276.6	6.2
50.0	5.32	5.85	6.33	6.57	6.33	6.07	5.61	6.06	6.75	6.77	6.06	5.29	2220.7	6.1
60.0	5.32	5.70	5.96	5.90	5.43	5.11	4.85	5.45	6.35	6.61	6.06	5.34	2069.2	5.7
70.0	5.17	5.40	5.44	5.09	4.44	4.11	4.01	4.71	5.78	6.28	5.91	5.25	1872.6	5.1
80.0	4.90	4.97	4.79	4.17	3.43	3.08	3.16	3.88	5.08	5.19	5.61	5.03	1637.7	4.5
90.0	4.50	4.43	4.04	3.21	2.44	2.14	2.32	3.02	4.27	5.16	5.16	4.67	1378.0	3.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: WINSLOW AZ  
 LATITUDE: 35 DEGREES 1 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	3.10	4.19	5.61	7.20	8.18	8.55	7.40	6.75	6.08	4.77	3.53	2.82	2075.4	5.7
10.0	3.69	4.72	6.05	7.42	8.20	8.47	7.41	6.96	6.57	5.46	4.27	3.47	2212.2	6.1
15.0	3.95	4.95	6.21	7.47	8.13	8.35	7.34	7.00	6.75	5.75	4.60	3.77	2260.6	6.2
20.0	4.19	5.15	6.34	7.47	8.01	8.19	7.24	7.00	6.90	6.01	4.90	4.04	2295.2	6.3
25.0	4.40	5.31	6.43	7.43	7.84	7.97	7.09	6.95	7.00	6.22	5.17	4.28	2315.7	6.3
30.0	4.59	5.45	6.48	7.34	7.63	7.70	6.90	6.87	7.06	6.40	5.41	4.50	2322.0	6.4
35.0	4.75	5.55	6.49	7.21	7.37	7.39	6.67	6.74	7.07	6.54	5.61	4.69	2314.0	6.3
40.0	4.87	5.61	6.45	7.04	7.09	7.06	6.42	6.59	7.04	6.44	5.78	4.85	2294.4	6.3
45.0	4.97	5.64	6.38	6.83	6.77	6.69	6.13	6.39	6.96	6.69	5.90	4.97	2260.8	6.2
50.0	5.03	5.64	6.28	6.57	6.40	6.29	5.82	6.15	6.85	6.70	5.99	5.07	2213.4	6.1
60.0	5.06	5.52	5.94	5.96	5.57	5.37	5.08	5.58	6.48	6.59	6.05	5.15	2078.6	5.7
70.0	4.95	5.27	5.47	5.20	4.62	4.39	4.25	4.88	5.96	6.30	5.94	5.10	1895.5	5.2
80.0	4.72	4.89	4.87	4.34	3.67	3.38	3.41	4.08	5.29	5.86	5.68	4.92	1675.6	4.6
90.0	4.37	4.39	4.16	3.41	2.68	2.42	2.55	3.23	4.50	5.27	5.27	4.61	1424.1	3.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: YUMA  
AZ  
LATITUDE: 32 DEGREES 40 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.45	4.55	6.04	7.60	8.61	8.87	7.74	7.35	6.46	5.12	3.83	3.15	2215.4	6.1
10.0	4.06	5.10	6.48	7.81	8.58	8.74	7.70	7.54	6.95	5.81	4.56	3.83	2348.6	6.4
15.0	4.33	5.33	6.64	7.84	8.48	8.59	7.62	7.57	7.13	6.10	4.89	4.13	2393.8	6.6
20.0	4.58	5.53	6.76	7.82	8.34	8.39	7.49	7.55	7.26	6.35	5.19	4.40	2424.1	6.6
25.0	4.79	5.69	6.84	7.75	8.14	8.14	7.31	7.48	7.35	6.56	5.45	4.65	2439.5	6.7
30.0	4.58	5.82	6.88	7.64	7.89	7.84	7.09	7.37	7.39	6.73	5.68	4.87	2439.7	6.7
35.0	5.13	5.91	6.87	7.48	7.60	7.51	6.84	7.22	7.39	6.86	5.87	5.06	2426.0	6.6
40.0	5.25	5.97	6.82	7.28	7.28	7.14	6.56	7.03	7.34	6.94	6.02	5.21	2398.7	6.6
45.0	5.34	5.99	6.73	7.04	6.92	6.74	6.24	6.80	7.24	6.98	6.13	5.33	2356.6	6.5
50.0	5.39	5.97	6.60	6.76	6.51	6.29	5.89	6.52	7.10	6.97	6.20	5.42	2300.0	6.3
60.0	5.39	5.82	6.21	6.07	5.59	5.30	5.09	5.86	6.68	6.82	6.22	5.48	2145.2	5.9
70.0	5.25	5.53	5.68	5.24	4.58	4.27	4.21	5.07	6.10	6.49	6.08	5.40	1942.4	5.3
80.0	4.98	5.10	5.01	4.30	3.55	3.20	3.31	4.16	5.37	6.00	5.78	5.18	1699.9	4.7
90.0	4.59	4.55	4.23	3.31	2.52	2.22	2.41	3.22	4.51	5.35	5.32	4.82	1430.1	3.9

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: ARCAT  
 CA  
 LATITUDE: 40 DEGREES 59 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.67	2.50	3.57	5.00	5.81	6.19	5.70	4.98	4.23	2.95	1.87	1.48	1399.8	3.8
10.0	1.97	2.81	3.84	5.18	5.88	6.20	5.76	5.17	4.58	3.36	2.25	1.82	1486.8	4.1
15.0	2.11	2.94	3.95	5.23	5.86	6.15	5.74	5.22	4.72	3.54	2.42	1.97	1518.3	4.2
20.0	2.24	3.05	4.03	5.25	5.82	6.08	5.69	5.24	4.84	3.70	2.57	2.11	1541.3	4.2
25.0	2.35	3.15	4.09	5.24	5.74	5.97	5.61	5.23	4.92	3.83	2.72	2.24	1555.6	4.3
30.0	2.45	3.23	4.13	5.20	5.63	5.82	5.51	5.19	4.98	3.95	2.84	2.36	1561.3	4.3
35.0	2.53	3.29	4.14	5.14	5.48	5.65	5.37	5.12	5.01	4.04	2.95	2.46	1558.1	4.3
40.0	2.60	3.34	4.14	5.04	5.31	5.45	5.20	5.03	5.00	4.10	3.04	2.55	1546.2	4.2
45.0	2.66	3.36	4.11	4.93	5.13	5.23	5.02	4.91	4.97	4.15	3.11	2.62	1527.1	4.2
50.0	2.69	3.36	4.05	4.78	4.92	4.99	4.81	4.77	4.91	4.16	3.16	2.67	1499.8	4.1
60.0	2.72	3.31	3.88	4.42	4.42	4.44	4.33	4.41	4.71	4.12	3.20	2.73	1420.6	3.9
70.0	2.68	3.19	3.62	3.97	3.84	3.80	3.76	3.95	4.39	3.98	3.17	2.72	1310.6	3.6
80.0	2.58	2.99	3.28	3.44	3.22	3.15	3.15	3.43	3.98	3.74	3.05	2.64	1176.0	3.2
90.0	2.41	2.73	2.88	2.85	2.58	2.47	2.53	2.84	3.48	3.42	2.86	2.50	1020.4	2.8



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BAKERSFIELD CA  
LATITUDE: 35 DEGREES 25 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.41	3.48	5.02	6.60	7.91	8.67	8.47	7.63	6.28	4.59	2.97	2.14	2016.1	5.5
10.0	2.81	3.87	5.39	6.81	7.93	8.60	8.49	7.90	6.82	5.25	3.53	2.56	2130.8	5.8
15.0	2.98	4.04	5.52	6.85	7.87	8.48	8.42	7.96	7.02	5.53	3.79	2.75	2169.0	5.9
20.0	3.14	4.18	5.63	6.85	7.76	8.32	8.30	7.97	7.18	5.78	4.02	2.92	2193.9	6.0
25.0	3.28	4.30	5.70	6.81	7.60	8.10	8.13	7.93	7.30	5.99	4.22	3.07	2205.5	6.0
30.0	3.40	4.39	5.74	6.73	7.40	7.83	7.90	7.84	7.36	6.16	4.40	3.21	2203.6	6.0
35.0	3.50	4.46	5.74	6.61	7.15	7.51	7.63	7.70	7.39	6.29	4.55	3.32	2188.3	6.0
40.0	3.58	4.50	5.71	6.46	6.89	7.18	7.34	7.52	7.36	6.39	4.67	3.42	2162.3	5.9
45.0	3.63	4.52	5.65	6.27	6.58	6.81	7.00	7.30	7.29	6.44	4.76	3.49	2123.3	5.8
50.0	3.67	4.50	5.55	6.04	6.24	6.40	6.63	7.03	7.17	6.45	4.82	3.55	2071.5	5.7
60.0	3.67	4.40	5.26	5.49	5.45	5.47	5.76	6.36	6.80	6.34	4.85	3.59	1931.3	5.3
70.0	3.58	4.19	4.84	4.82	4.55	4.47	4.76	5.55	6.26	6.08	4.76	3.54	1746.4	4.8
80.0	3.41	3.89	4.32	4.04	3.64	3.45	3.77	4.61	5.56	5.65	4.54	3.40	1529.6	4.2
90.0	3.15	3.50	3.71	3.21	2.69	2.47	2.73	3.60	4.74	5.09	4.21	3.18	1285.2	3.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CHINA LAKE CA  
LATITUDE: 35 DEGREES 41 MINUTES

APRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.86	3.88	5.46	7.04	5.03	8.66	8.24	8.24	6.24	4.64	3.26	2.65	2109.0	5.8
10.0	3.40	4.37	5.89	7.27	3.06	8.60	8.26	8.55	6.78	5.32	3.93	3.27	2245.0	6.2
15.0	3.64	4.58	6.06	7.32	8.00	8.48	8.20	8.62	6.99	5.61	4.23	3.54	2292.6	6.3
20.0	3.86	4.76	6.18	7.33	7.89	8.32	8.08	8.63	7.15	5.87	4.51	3.80	2326.0	6.4
25.0	4.05	4.91	6.27	7.29	7.73	8.10	7.92	8.59	7.26	6.08	4.76	4.03	2345.1	6.4
30.0	4.22	5.03	6.32	7.21	7.53	7.84	7.71	8.50	7.34	6.26	4.97	4.24	2349.7	6.4
35.0	4.37	5.12	6.34	7.08	7.28	7.53	7.45	8.35	7.36	6.40	5.16	4.41	2339.8	6.4
40.0	4.48	5.18	6.31	6.92	7.01	7.19	7.17	8.16	7.34	6.50	5.31	4.56	2317.9	6.4
45.0	4.57	5.21	6.25	6.72	6.70	6.83	6.85	7.92	7.27	6.56	5.43	4.68	2282.1	6.3
50.0	4.62	5.20	6.14	6.48	6.35	6.42	6.48	7.63	7.15	6.57	5.51	4.77	2232.2	6.1
60.0	4.65	5.10	5.83	5.88	5.55	5.50	5.65	6.91	6.79	6.47	5.56	4.86	2092.1	5.7
70.0	4.56	4.87	5.37	5.16	4.63	4.49	4.70	6.03	6.25	6.20	5.46	4.82	1902.8	5.2
80.0	4.35	4.53	4.80	4.32	3.70	3.48	3.74	5.01	5.56	5.77	5.23	4.65	1676.7	4.6
90.0	4.04	4.07	4.11	3.41	2.73	2.49	2.73	3.91	4.74	5.20	4.85	4.36	1418.3	3.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DAGGETT  
CA  
LATITUDE: 34 DEGREES 52 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	A	S	O	N	D			
0.0	3.01	4.04	5.59	7.17	8.17	8.72	8.20	7.52	6.33	4.78	3.42	2.76	2123.3	5.8
10.0	3.57	4.54	6.02	7.39	8.18	8.64	8.21	7.76	6.86	5.46	4.11	3.38	2257.6	6.2
15.0	3.82	4.75	6.18	7.44	8.11	8.52	8.14	7.82	7.06	5.75	4.42	3.67	2304.2	6.3
20.0	4.04	4.94	6.30	7.44	7.99	8.34	8.02	7.82	7.21	6.01	4.71	3.92	2336.6	6.4
25.0	4.24	5.09	6.39	7.39	7.83	8.12	7.85	7.77	7.32	6.22	4.96	4.16	2354.6	6.5
30.0	4.42	5.21	6.43	7.30	7.61	7.84	7.63	7.68	7.39	6.40	5.18	4.36	2358.1	6.5
35.0	4.56	5.30	6.44	7.17	7.35	7.52	7.37	7.54	7.41	6.54	5.37	4.54	2347.0	6.4
40.0	4.68	5.36	6.41	7.00	7.07	7.18	7.08	7.36	7.37	6.63	5.52	4.69	2324.2	6.4
45.0	4.77	5.39	6.34	6.79	6.75	6.80	6.76	7.14	7.30	6.68	5.64	4.81	2287.0	6.3
50.0	4.82	5.38	6.23	6.54	6.38	6.39	6.39	6.87	7.17	6.69	5.72	4.90	2235.8	6.1
60.0	4.84	5.26	5.90	5.92	5.55	5.44	5.55	6.21	6.79	6.58	5.76	4.97	2092.9	5.7
70.0	4.74	5.02	5.43	5.17	4.60	4.43	4.60	5.41	6.24	6.29	5.66	4.92	1901.4	5.2
80.0	4.52	4.65	4.83	4.31	3.66	3.40	3.64	4.49	5.54	5.85	5.40	4.74	1673.0	4.6
90.0	4.18	4.18	4.12	3.39	2.67	2.41	2.65	3.50	4.70	5.26	5.01	4.44	1413.8	3.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: EL TORO  
CA  
LATITUDE: 33 DEGREES 40 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.98	3.90	5.07	6.08	6.53	6.91	7.46	6.79	5.47	4.28	3.23	2.74	1871.6	5.1
10.0	3.49	4.35	5.41	6.23	6.51	6.83	7.44	6.97	5.86	4.81	3.82	3.31	1980.5	5.4
15.0	3.71	4.53	5.54	6.25	6.45	6.74	7.37	7.01	6.00	5.04	4.08	3.57	2017.8	5.5
20.0	3.91	4.69	5.63	6.24	6.35	6.60	7.25	6.99	6.10	5.23	4.32	3.80	2043.2	5.6
25.0	4.09	4.82	5.69	6.19	6.22	6.43	7.09	6.94	6.17	5.39	4.52	4.01	2056.5	5.6
30.0	4.24	4.93	5.71	6.10	6.05	6.22	6.89	6.85	6.20	5.52	4.70	4.19	2057.6	5.6
35.0	4.37	5.00	5.70	5.98	5.85	5.98	6.65	6.71	6.19	5.61	4.86	4.35	2047.1	5.6
40.0	4.47	5.04	5.66	5.83	5.63	5.72	6.39	6.54	6.15	5.67	4.98	4.48	2026.0	5.6
45.0	4.54	5.06	5.59	5.65	5.38	5.44	6.09	6.33	6.07	5.70	5.06	4.58	1992.9	5.5
50.0	4.58	5.04	5.48	5.44	5.10	5.12	5.76	6.09	5.95	5.69	5.12	4.65	1948.2	5.3
60.0	4.58	4.91	5.17	4.93	4.47	4.42	5.01	5.50	5.61	5.56	5.13	4.71	1825.0	5.0
70.0	4.47	4.67	4.74	4.31	3.76	3.67	4.17	4.79	5.14	5.29	5.01	4.64	1662.2	4.6
80.0	4.24	4.31	4.21	3.61	3.04	2.90	3.32	3.98	4.55	4.90	4.76	4.45	1467.5	4.0
90.0	3.91	3.86	3.58	2.87	2.31	2.17	2.45	3.12	3.86	4.39	4.40	4.15	1248.6	3.4

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: FRESNO  
 CA  
 LATITUDE: 36 DEGREES 46 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.07	3.19	4.93	6.60	7.83	8.62	8.46	7.64	6.25	4.51	2.80	1.81	1972.2	5.4
10.0	2.40	3.56	5.31	6.83	7.87	8.57	8.51	7.94	6.82	5.19	3.36	2.16	2088.0	5.7
15.0	2.55	3.72	5.45	6.88	7.82	8.47	8.46	8.01	7.05	5.48	3.61	2.32	2127.2	5.8
20.0	2.68	3.85	5.57	6.89	7.72	8.32	8.35	8.04	7.22	5.74	3.84	2.46	2153.4	5.9
25.0	2.80	3.97	5.65	6.86	7.58	8.11	8.19	8.01	7.35	5.96	4.04	2.59	2166.5	5.9
30.0	2.90	4.06	5.69	6.79	7.39	7.86	7.98	7.93	7.44	6.15	4.22	2.70	2166.3	5.9
35.0	2.99	4.12	5.70	6.68	7.16	7.56	7.72	7.81	7.48	6.29	4.38	2.80	2152.9	5.9
40.0	3.05	4.16	5.68	6.54	6.90	7.23	7.43	7.64	7.46	6.40	4.50	2.88	2128.2	5.8
45.0	3.10	4.18	5.63	6.35	6.61	6.88	7.11	7.43	7.40	6.46	4.60	2.94	2091.7	5.7
50.0	3.13	4.17	5.54	6.14	6.28	6.48	6.74	7.17	7.30	6.48	4.66	2.99	2042.4	5.6
60.0	3.14	4.09	5.27	5.60	5.52	5.58	5.89	6.52	6.95	6.40	4.71	3.02	1907.6	5.2
70.0	3.06	3.90	4.87	4.93	4.64	4.59	4.91	5.71	6.42	6.15	4.63	2.98	1728.5	4.7
80.0	2.92	3.63	4.36	4.16	3.74	3.59	3.91	4.78	5.73	5.74	4.43	2.87	1517.2	4.2
90.0	2.71	3.28	3.76	3.33	2.79	2.59	2.86	3.76	4.91	5.19	4.12	2.69	1276.9	3.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LONG BEACH  
CA  
LATITUDE: 33 DEGREES 49 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.92	3.83	5.07	6.11	6.50	6.74	7.25	6.62	5.36	4.18	3.16	2.67	1840.3	5.0
10.0	3.42	4.27	5.41	6.26	6.49	6.67	7.24	6.80	5.73	4.70	3.73	3.22	1946.9	5.3
15.0	3.63	4.45	5.54	6.29	6.43	6.57	7.17	6.83	5.87	4.92	3.98	3.46	1983.3	5.4
20.0	3.83	4.61	5.63	6.27	6.33	6.44	7.06	6.82	5.97	5.10	4.21	3.69	2008.1	5.5
25.0	4.00	4.73	5.69	6.22	6.20	6.27	6.90	6.77	6.03	5.26	4.41	3.89	2021.1	5.5
30.0	4.15	4.83	5.72	6.14	6.03	6.07	6.71	6.67	6.06	5.38	4.59	4.07	2022.2	5.5
35.0	4.28	4.91	5.71	6.02	5.84	5.84	6.48	6.55	6.06	5.47	4.73	4.22	2011.8	5.5
40.0	4.37	4.95	5.67	5.87	5.62	5.59	6.23	6.38	6.01	5.53	4.85	4.35	1991.1	5.5
45.0	4.44	4.96	5.60	5.69	5.37	5.32	5.95	6.18	5.94	5.55	4.93	4.44	1958.8	5.4
50.0	4.49	4.94	5.49	5.47	5.10	5.01	5.63	5.94	5.82	5.54	4.99	4.51	1914.9	5.2
60.0	4.49	4.82	5.18	4.96	4.47	4.33	4.90	5.37	5.49	5.42	5.00	4.56	1794.4	4.9
70.0	4.37	4.58	4.75	4.34	3.76	3.61	4.09	4.68	5.03	5.16	4.88	4.50	1634.9	4.5
80.0	4.15	4.23	4.22	3.63	3.05	2.86	3.27	3.90	4.46	4.78	4.64	4.32	1444.4	4.0
90.0	3.83	3.79	3.60	2.89	2.32	2.16	2.43	3.07	3.79	4.28	4.29	4.03	1229.9	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LOS ANGELES CA  
LATITUDE: 33 DEGREES 56 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.92	3.63	5.10	6.15	6.49	6.68	7.27	6.56	5.30	4.15	3.16	2.68	1836.5	5.0
10.0	3.41	4.27	5.45	6.31	6.48	6.61	7.26	6.73	5.67	4.66	3.74	3.23	1943.7	5.3
15.0	3.63	4.45	5.58	6.33	6.42	6.52	7.19	6.76	5.80	4.88	3.99	3.48	1980.5	5.4
20.0	3.83	4.61	5.67	6.32	6.33	6.39	7.08	6.75	5.90	5.07	4.23	3.71	2005.7	5.5
25.0	4.01	4.74	5.73	6.27	6.19	6.23	6.93	6.70	5.97	5.22	4.43	3.92	2019.0	5.5
30.0	4.16	4.84	5.76	6.18	6.03	6.03	6.74	6.61	6.00	5.35	4.61	4.10	2020.5	5.5
35.0	4.28	4.91	5.75	6.06	5.83	5.80	6.51	6.48	5.99	5.44	4.76	4.25	2010.5	5.5
40.0	4.38	4.95	5.71	5.91	5.61	5.56	6.26	6.32	5.95	5.49	4.87	4.38	1990.3	5.5
45.0	4.45	4.97	5.64	5.73	5.37	5.28	5.97	6.13	5.87	5.52	4.96	4.48	1958.3	5.4
50.0	4.49	4.95	5.53	5.52	5.09	4.98	5.65	5.89	5.76	5.51	5.02	4.55	1915.0	5.2
60.0	4.49	4.83	5.22	5.00	4.47	4.31	4.92	5.33	5.43	5.38	5.03	4.60	1795.3	4.9
70.0	4.38	4.59	4.79	4.37	3.76	3.60	4.11	4.65	4.98	5.13	4.91	4.54	1636.5	4.5
80.0	4.16	4.24	4.26	3.66	3.05	2.86	3.28	3.87	4.41	4.75	4.67	4.36	1446.7	4.0
90.0	3.84	3.80	3.63	2.91	2.32	2.16	2.44	3.06	3.75	4.25	4.32	4.07	1232.6	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MOUNT SHASTA CA  
 LATITUDE: 41 DEGREES 19 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.77	2.71	3.94	5.54	6.89	7.68	8.13	6.98	5.47	3.64	2.08	1.59	1719.7	4.7
10.0	2.12	3.06	4.26	5.77	6.99	7.70	8.26	7.32	6.03	4.24	2.54	1.98	1837.1	5.0
15.0	2.27	3.22	4.39	5.83	6.98	7.65	8.25	7.42	6.26	4.51	2.75	2.16	1880.0	5.2
20.0	2.42	3.35	4.49	5.86	6.93	7.56	8.19	7.48	6.45	4.74	2.94	2.33	1911.6	5.2
25.0	2.55	3.47	4.57	5.86	6.83	7.42	8.08	7.49	6.60	4.95	3.11	2.48	1931.9	5.3
30.0	2.66	3.57	4.62	5.82	6.70	7.23	7.92	7.46	6.71	5.13	3.26	2.61	1940.6	5.3
35.0	2.76	3.64	4.64	5.75	6.53	7.01	7.71	7.38	6.77	5.27	3.40	2.73	1937.6	5.3
40.0	2.84	3.70	4.64	5.65	6.32	6.74	7.45	7.25	6.80	5.38	3.51	2.84	1923.0	5.3
45.0	2.91	3.73	4.61	5.52	6.10	6.46	7.17	7.09	6.77	5.46	3.60	2.92	1899.0	5.2
50.0	2.95	3.74	4.55	5.36	5.84	6.15	6.86	6.89	6.71	5.50	3.67	2.99	1864.4	5.1
60.0	2.99	3.70	4.37	4.96	5.23	5.43	6.11	6.36	6.46	5.48	3.73	3.07	1762.3	4.8
70.0	2.96	3.56	4.08	4.45	4.52	4.59	5.22	5.68	6.04	5.32	3.70	3.06	1619.2	4.4
80.0	2.85	3.35	3.71	3.84	3.74	3.74	4.27	4.87	5.48	5.02	3.57	2.98	1443.4	4.0
90.0	2.67	3.06	3.25	3.17	2.95	2.85	3.29	3.95	4.79	4.59	3.36	2.83	1240.2	3.4



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: NEEDLES  
CA  
LATITUDE: 34 DEGREES 46 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.10	4.27	5.75	7.31	8.36	8.80	8.01	7.18	6.35	4.84	3.54	2.88	2143.5	5.9
10.0	3.68	4.82	6.20	7.54	8.37	8.72	8.02	7.40	6.87	5.54	4.27	3.54	2282.5	6.3
15.0	3.94	5.05	6.37	7.58	8.30	8.59	7.95	7.45	7.07	5.84	4.60	3.84	2331.2	6.4
20.0	4.17	5.25	6.50	7.58	8.18	8.41	7.83	7.45	7.23	6.10	4.90	4.12	2365.5	6.5
25.0	4.38	5.42	6.59	7.54	8.00	8.18	7.66	7.40	7.34	6.32	5.17	4.37	2385.2	6.5
30.0	4.56	5.56	6.61	7.45	7.78	7.91	7.45	7.31	7.40	6.50	5.40	4.59	2390.1	6.5
35.0	4.71	5.66	6.65	7.31	7.51	7.58	7.19	7.18	7.42	6.64	5.60	4.78	2380.3	6.5
40.0	4.83	5.73	6.62	7.13	7.22	7.24	6.92	7.01	7.39	6.73	5.76	4.94	2358.4	6.5
45.0	4.93	5.76	6.54	6.92	6.89	6.86	6.60	6.79	7.31	6.78	5.88	5.07	2322.0	6.4
50.0	4.99	5.75	6.43	6.66	6.51	6.43	6.25	6.54	7.18	6.79	5.97	5.16	2271.3	6.2
60.0	5.01	5.63	6.09	6.03	5.66	5.48	5.43	5.92	6.80	6.68	6.02	5.25	2128.6	5.8
70.0	4.90	5.38	5.60	5.26	4.68	4.46	4.51	5.16	6.25	6.39	5.91	5.20	1936.2	5.3
80.0	4.67	4.99	4.98	4.37	3.70	3.41	3.58	4.29	5.54	5.94	5.65	5.01	1706.1	4.7
90.0	4.32	4.48	4.25	3.43	2.68	2.42	2.62	3.37	4.70	5.33	5.23	4.69	1444.2	4.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: OAKLAND  
CA  
LATITUDE: 37 DEGREES 44 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.23	3.21	4.59	6.06	6.97	7.41	7.32	6.47	5.16	3.82	2.59	2.05	1769.4	4.8
10.0	2.63	3.60	4.94	6.27	7.02	7.39	7.37	6.70	5.82	4.36	3.12	2.50	1879.7	5.1
15.0	2.61	3.77	5.08	6.31	6.98	7.31	7.33	6.76	6.00	4.59	3.35	2.70	1918.6	5.3
20.0	2.97	3.91	5.18	6.33	6.90	7.19	7.24	6.78	6.14	4.80	3.56	2.89	1946.1	5.3
25.0	3.12	4.03	5.26	6.30	6.79	7.03	7.12	6.76	6.24	4.97	3.76	3.06	1962.2	5.4
30.0	3.25	4.13	5.30	6.24	6.63	6.83	6.95	6.70	6.31	5.12	3.93	3.21	1966.7	5.4
35.0	3.35	4.21	5.32	6.15	6.43	6.59	6.74	6.59	6.33	5.23	4.07	3.35	1959.5	5.4
40.0	3.44	4.26	5.30	6.02	6.21	6.32	6.50	6.46	6.32	5.31	4.19	3.46	1941.8	5.3
45.0	3.51	4.28	5.25	5.86	5.96	6.04	6.24	6.28	6.27	5.36	4.28	3.55	1913.9	5.2
50.0	3.55	4.28	5.17	5.67	5.68	5.72	5.94	6.08	6.18	5.37	4.35	3.62	1874.8	5.1
60.0	3.57	4.20	4.92	5.19	5.03	4.99	5.25	5.56	5.89	5.30	4.39	3.68	1764.0	4.8
70.0	3.51	4.02	4.56	4.60	4.28	4.17	4.44	4.91	5.45	5.10	4.33	3.65	1613.2	4.4
80.0	3.36	3.75	4.10	3.91	3.50	3.35	3.62	4.16	4.89	4.76	4.15	3.53	1432.3	3.9
90.0	3.12	3.39	3.55	3.16	2.69	2.53	2.75	3.34	4.22	4.32	3.87	3.32	1224.1	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: POINT MUGU  
LATITUDE: 34 DEGREES 7 MINUTES CA

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.92	3.85	5.15	6.15	6.36	6.48	6.67	6.10	5.07	4.09	3.17	2.70	1787.2	4.9
10.0	3.42	4.29	5.51	6.31	6.35	6.41	6.67	6.26	5.41	4.59	3.75	3.27	1894.6	5.2
15.0	3.64	4.48	5.64	6.34	6.29	6.32	6.60	6.28	5.54	4.80	4.01	3.52	1932.0	5.3
20.0	3.84	4.64	5.74	6.33	6.20	6.20	6.50	6.27	5.63	4.99	4.24	3.76	1953.1	5.4
25.0	4.02	4.77	5.80	6.28	6.07	6.04	6.37	6.22	5.69	5.14	4.45	3.97	1972.8	5.4
30.0	4.17	4.87	5.83	6.20	5.91	5.85	6.19	6.14	5.72	5.26	4.63	4.16	1976.0	5.4
35.0	4.30	4.95	5.83	6.08	5.72	5.63	5.99	6.02	5.71	5.35	4.78	4.32	1967.9	5.4
40.0	4.40	4.99	5.79	5.93	5.51	5.40	5.77	5.87	5.67	5.41	4.90	4.45	1949.8	5.3
45.0	4.47	5.01	5.72	5.75	5.27	5.14	5.51	5.69	5.59	5.43	4.99	4.55	1920.4	5.3
50.0	4.52	4.99	5.61	5.53	5.00	4.85	5.23	5.48	5.49	5.42	5.05	4.63	1879.8	5.2
60.0	4.52	4.87	5.30	5.01	4.40	4.21	4.58	4.97	5.18	5.30	5.07	4.69	1766.4	4.8
70.0	4.41	4.63	4.87	4.39	3.71	3.52	3.85	4.35	4.75	5.05	4.95	4.62	1614.6	4.4
80.0	4.19	4.28	4.32	3.68	3.02	2.81	3.11	3.64	4.22	4.68	4.72	4.44	1432.1	3.9
90.0	3.87	3.84	3.69	2.93	2.31	2.14	2.36	2.90	3.59	4.19	4.36	4.15	1225.2	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: RED BLUFF CA  
LATITUDE: 40 DEGREES 9 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.80	2.81	4.27	6.02	7.49	8.20	8.42	7.29	5.81	3.87	2.23	1.61	1823.9	5.0
10.0	2.13	3.17	4.62	6.27	7.58	8.21	8.54	7.63	6.41	4.50	2.70	1.98	1942.7	5.3
15.0	2.28	3.32	4.75	6.33	7.56	8.15	8.52	7.74	6.65	4.78	2.91	2.14	1985.1	5.4
20.0	2.41	3.46	4.86	6.36	7.50	8.03	8.44	7.79	6.84	5.02	3.11	2.30	2015.5	5.5
25.0	2.53	3.57	4.95	6.36	7.39	7.87	8.32	7.79	7.00	5.24	3.29	2.44	2033.6	5.6
30.0	2.64	3.67	5.00	6.31	7.24	7.66	8.14	7.75	7.10	5.42	3.45	2.56	2039.5	5.6
35.0	2.73	3.74	5.02	6.23	7.04	7.41	7.91	7.66	7.17	5.56	3.58	2.67	2033.0	5.6
40.0	2.80	3.79	5.02	6.11	6.80	7.11	7.64	7.52	7.19	5.68	3.69	2.76	2014.1	5.5
45.0	2.86	3.82	4.98	5.97	6.55	6.81	7.34	7.34	7.16	5.75	3.78	2.84	1986.0	5.4
50.0	2.90	3.83	4.92	5.79	6.26	6.46	7.00	7.12	7.08	5.79	3.85	2.90	1946.0	5.3
60.0	2.92	3.77	4.71	5.33	5.57	5.66	6.20	6.55	6.80	5.75	3.91	2.96	1831.4	5.0
70.0	2.88	3.63	4.39	4.76	4.77	4.74	5.26	5.82	6.34	5.57	3.87	2.95	1673.7	4.6
80.0	2.77	3.40	3.97	4.09	3.91	3.82	4.26	4.95	5.73	5.24	3.73	2.86	1483.3	4.1
90.0	2.59	3.09	3.47	3.34	3.03	2.86	3.23	3.98	4.98	4.79	3.49	2.70	1264.0	3.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SACRAMENTO CA  
LATITUDE: 38 DEGREES 31 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.88	2.97	4.59	6.32	7.67	8.46	8.48	7.47	6.01	4.14	2.47	1.70	1894.6	5.2
10.0	2.20	3.32	4.96	6.55	7.74	8.44	8.56	7.79	6.59	4.79	2.97	2.05	2011.1	5.5
15.0	2.34	3.48	5.10	6.61	7.71	8.36	8.53	7.88	6.82	5.07	3.20	2.21	2051.4	5.6
20.0	2.47	3.61	5.21	6.64	7.63	8.23	8.44	7.92	7.01	5.32	3.41	2.36	2079.4	5.7
25.0	2.58	3.72	5.29	6.62	7.50	8.05	8.29	7.91	7.15	5.54	3.59	2.49	2094.7	5.7
30.0	2.68	3.81	5.35	6.56	7.33	7.82	8.10	7.85	7.25	5.72	3.76	2.61	2097.2	5.7
35.0	2.77	3.88	5.37	6.47	7.12	7.54	7.85	7.74	7.30	5.86	3.90	2.71	2087.0	5.7
40.0	2.83	3.93	5.35	6.34	6.87	7.22	7.57	7.59	7.30	5.97	4.02	2.80	2065.0	5.7
45.0	2.88	3.95	5.31	6.17	6.60	6.89	7.26	7.40	7.26	6.04	4.11	2.87	2032.5	5.6
50.0	2.92	3.95	5.23	5.98	6.29	6.52	6.91	7.16	7.17	6.07	4.17	2.92	1987.8	5.4
60.0	2.93	3.88	4.99	5.48	5.56	5.66	6.08	6.55	6.86	6.01	4.22	2.96	1863.0	5.1
70.0	2.87	3.72	4.64	4.86	4.72	4.69	5.11	5.78	6.37	5.80	4.16	2.94	1694.5	4.6
80.0	2.75	3.47	4.18	4.14	3.84	3.73	4.11	4.88	5.72	5.44	4.00	2.84	1494.1	4.1
90.0	2.56	3.15	3.63	3.35	2.92	2.74	3.06	3.88	4.94	4.94	3.74	2.67	1264.6	3.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SAN DIEGO  
CA  
LATITUDE: 32 DEGREES 44 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	3.07	4.00	5.14	6.11	6.31	6.50	6.89	6.48	5.41	4.33	3.35	2.85	1840.5	5.0
10.0	3.58	4.44	5.47	6.24	6.29	6.42	6.36	6.64	5.77	4.85	3.94	3.42	1945.7	5.3
15.0	3.80	4.62	5.59	6.26	6.22	6.32	6.79	6.66	5.90	5.07	4.19	3.67	1981.5	5.4
20.0	4.00	4.78	5.68	6.24	6.12	6.19	6.67	6.64	5.99	5.25	4.43	3.90	2005.8	5.5
25.0	4.18	4.91	5.73	6.18	5.99	6.02	6.52	6.58	6.05	5.41	4.64	4.11	2018.3	5.5
30.0	4.33	5.01	5.75	6.09	5.82	5.83	6.33	6.48	6.07	5.53	4.81	4.29	2018.9	5.5
35.0	4.45	5.08	5.74	5.97	5.63	5.60	6.12	6.35	6.06	5.62	4.96	4.45	2008.5	5.5
40.0	4.54	5.11	5.69	5.81	5.41	5.36	5.88	6.18	6.01	5.67	5.08	4.58	1987.4	5.4
45.0	4.61	5.12	5.61	5.62	5.17	5.09	5.60	5.98	5.92	5.68	5.16	4.67	1954.6	5.4
50.0	4.65	5.10	5.49	5.40	4.90	4.80	5.30	5.75	5.80	5.67	5.21	4.74	1910.5	5.2
60.0	4.64	4.96	5.17	4.88	4.28	4.14	4.61	5.18	5.46	5.53	5.21	4.79	1789.5	4.9
70.0	4.51	4.70	4.73	4.26	3.60	3.45	3.85	4.50	4.98	5.25	5.08	4.71	1630.5	4.5
80.0	4.27	4.33	4.19	3.55	2.91	2.73	3.08	3.73	4.40	4.85	4.82	4.51	1439.7	3.9
90.0	3.93	3.87	3.55	2.81	2.22	2.06	2.30	2.93	3.72	4.33	4.43	4.19	1226.3	3.4

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: SAN FRANCISCO CA  
 LATITUDE: 37 DEGREES 37 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.23	3.19	4.59	6.05	7.02	7.49	7.54	6.68	5.49	3.86	2.59	2.03	1790.3	4.9
10.0	2.63	3.57	4.94	6.26	7.07	7.47	7.60	6.92	5.96	4.41	3.11	2.47	1900.7	5.2
15.0	2.81	3.73	5.07	6.31	7.03	7.39	7.55	6.98	6.14	4.65	3.34	2.67	1939.4	5.3
20.0	2.97	3.87	5.18	6.32	6.95	7.27	7.47	7.00	6.29	4.85	3.55	2.86	1966.6	5.4
25.0	3.11	3.99	5.25	6.29	6.83	7.10	7.33	6.98	6.40	5.03	3.74	3.03	1982.2	5.4
30.0	3.24	4.09	5.29	6.23	6.67	6.90	7.16	6.92	6.47	5.18	3.91	3.17	1986.0	5.4
35.0	3.34	4.16	5.31	6.13	6.47	6.65	6.94	6.81	6.49	5.29	4.05	3.30	1978.0	5.4
40.0	3.43	4.21	5.29	6.01	6.24	6.38	6.69	6.67	6.48	5.37	4.17	3.41	1959.4	5.4
45.0	3.49	4.23	5.24	5.85	5.99	6.09	6.42	6.49	6.43	5.42	4.26	3.50	1930.6	5.3
50.0	3.54	4.23	5.16	5.65	5.71	5.77	6.11	6.27	6.34	5.44	4.32	3.57	1890.3	5.2
60.0	3.56	4.15	4.91	5.17	5.06	5.03	5.39	5.73	6.04	5.36	4.37	3.63	1776.9	4.9
70.0	3.49	3.97	4.55	4.58	4.30	4.20	4.55	5.06	5.59	5.15	4.30	3.60	1623.1	4.4
80.0	3.34	3.70	4.09	3.90	3.51	3.37	3.69	4.28	5.01	4.82	4.12	3.48	1439.1	3.9
90.0	3.11	3.35	3.54	3.15	2.69	2.53	2.79	3.43	4.32	4.36	3.84	3.27	1227.6	3.4

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SANTA MARIA CA  
LATITUDE: 34 DEGREES 54 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS P' MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.69	3.60	4.98	6.06	6.74	7.41	7.38	6.64	5.45	4.27	3.06	2.54	1852.3	5.1
10.0	3.14	4.01	5.33	6.23	6.74	7.34	7.38	6.84	5.86	4.83	3.64	3.07	1962.0	5.4
15.0	3.34	4.18	5.46	6.26	6.69	7.24	7.32	6.88	6.01	5.07	3.90	3.32	1999.7	5.5
20.0	3.53	4.33	5.56	6.25	6.59	7.10	7.21	6.88	6.12	5.28	4.13	3.54	2025.7	5.5
25.0	3.69	4.45	5.63	6.21	6.46	6.92	7.06	6.83	6.20	5.46	4.34	3.74	2039.7	5.6
30.0	3.83	4.55	5.66	6.13	6.29	6.70	6.87	6.75	6.24	5.60	4.52	3.92	2041.6	5.6
35.0	3.94	4.62	5.66	6.02	6.09	6.44	6.64	6.62	6.25	5.71	4.68	4.07	2031.4	5.6
40.0	4.03	4.66	5.63	5.87	5.87	6.17	6.39	6.47	6.21	5.78	4.80	4.20	2011.4	5.5
45.0	4.10	4.67	5.56	5.70	5.62	5.86	6.11	6.27	6.14	5.82	4.89	4.30	1979.5	5.4
50.0	4.14	4.66	5.46	5.49	5.33	5.53	5.79	6.04	6.03	5.81	4.95	4.37	1935.9	5.3
60.0	4.15	4.55	5.17	4.99	4.69	4.77	5.06	5.48	5.70	5.70	4.98	4.43	1815.3	5.0
70.0	4.05	4.33	4.75	4.38	3.95	3.95	4.23	4.79	5.24	5.45	4.88	4.38	1654.3	4.5
80.0	3.85	4.01	4.24	3.69	3.21	3.12	3.40	4.01	4.66	5.06	4.65	4.21	1462.7	4.0
90.0	3.56	3.60	3.63	2.95	2.43	2.32	2.53	3.17	3.97	4.55	4.31	3.94	1245.3	3.4



AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: SUNNYVALE CA  
 LATITUDE: 37 DEGREES 25 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.32	3.27	4.67	6.13	7.18	7.74	7.69	6.83	5.54	3.93	2.66	2.08	1830.0	5.0
10.0	2.74	3.67	5.03	6.34	7.22	7.71	7.74	7.09	6.02	4.49	3.19	2.54	1943.1	5.3
15.0	2.93	3.84	5.17	6.38	7.18	7.62	7.70	7.15	6.21	4.73	3.43	2.75	1982.7	5.4
20.0	3.10	3.98	5.28	6.40	7.10	7.49	7.61	7.17	6.35	4.94	3.65	2.94	2010.5	5.5
25.0	3.25	4.11	5.35	6.37	6.98	7.32	7.47	7.15	6.46	5.12	3.84	3.11	2026.4	5.6
30.0	3.39	4.21	5.40	6.31	6.81	7.11	7.29	7.08	6.53	5.27	4.01	3.26	2030.1	5.6
35.0	3.50	4.28	5.41	6.21	6.61	6.85	7.06	6.97	6.55	5.39	4.16	3.40	2021.7	5.5
40.0	3.59	4.33	5.39	6.08	6.37	6.57	6.81	6.82	6.54	5.47	4.28	3.51	2002.5	5.5
45.0	3.66	4.35	5.34	5.91	6.12	6.27	6.53	6.64	6.49	5.52	4.38	3.60	1972.7	5.4
50.0	3.70	4.35	5.26	5.72	5.82	5.93	6.21	6.42	6.39	5.54	4.44	3.66	1931.1	5.3
60.0	3.73	4.27	5.01	5.23	5.15	5.15	5.47	5.86	6.09	5.46	4.49	3.73	1814.3	5.0
70.0	3.66	4.09	4.64	4.63	4.36	4.29	4.61	5.16	5.64	5.24	4.42	3.70	1656.1	4.5
80.0	3.50	3.81	4.16	3.93	3.56	3.42	3.73	4.36	5.05	4.90	4.23	3.57	1466.9	4.0
90.0	3.25	3.44	3.60	3.17	2.71	2.55	2.80	3.48	4.35	4.44	3.94	3.36	1249.6	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: COLORADO SPRINGS CO  
LATITUDE: 38 DEGREES 49 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.81	3.72	4.88	6.09	6.71	7.47	6.97	6.39	5.54	4.28	2.98	2.47	1836.4	5.0
10.0	3.45	4.25	5.29	6.32	6.77	7.46	7.03	6.64	6.05	4.98	3.69	3.14	1980.9	5.4
15.0	3.73	4.48	5.46	6.38	6.74	7.39	7.00	6.70	6.25	5.28	4.02	3.45	2035.8	5.6
20.0	4.00	4.69	5.59	6.40	6.67	7.28	6.93	6.73	6.42	5.55	4.31	3.74	2078.5	5.7
25.0	4.24	4.86	5.68	6.38	6.56	7.12	6.82	6.72	6.54	5.79	4.58	4.00	2108.7	5.8
30.0	4.45	5.01	5.74	6.33	6.42	6.93	6.67	6.66	6.62	5.98	4.82	4.24	2126.1	5.8
35.0	4.63	5.12	5.77	6.24	6.24	6.69	6.48	6.57	6.66	6.14	5.03	4.45	2130.6	5.8
40.0	4.78	5.21	5.76	6.11	6.03	6.42	6.26	6.44	6.66	6.26	5.20	4.63	2122.8	5.8
45.0	4.91	5.26	5.72	5.96	5.80	6.14	6.01	6.27	6.62	6.34	5.34	4.77	2103.9	5.8
50.0	5.00	5.27	5.65	5.77	5.54	5.83	5.74	6.07	6.54	6.38	5.45	4.89	2072.3	5.7
60.0	5.08	5.21	5.40	5.30	4.93	5.10	5.10	5.57	6.25	6.33	5.55	5.03	1971.9	5.4
70.0	5.03	5.02	5.02	4.71	4.22	4.28	4.35	4.94	5.81	6.11	5.50	5.03	1824.9	5.0
80.0	4.84	4.70	4.52	4.02	3.48	3.46	3.57	4.21	5.22	5.74	5.31	4.89	1640.8	4.5
90.0	4.53	4.27	3.93	3.26	2.71	2.62	2.76	3.40	4.52	5.22	4.97	4.63	1422.6	3.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DENVER  
CO  
LATITUDE: 39 DEGREES 45 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.65	3.55	4.82	5.93	6.73	7.41	7.16	6.45	5.44	4.10	2.79	2.31	1807.2	5.0
10.0	3.27	4.07	5.25	6.16	6.80	7.42	7.24	6.71	5.96	4.78	3.47	2.95	1950.9	5.3
15.0	3.54	4.30	5.42	6.22	6.77	7.35	7.21	6.79	6.16	5.08	3.78	3.25	2005.7	5.5
20.0	3.80	4.50	5.55	6.25	6.71	7.25	7.15	6.82	6.33	5.34	4.06	3.52	2048.5	5.6
25.0	4.03	4.67	5.66	6.23	6.61	7.11	7.04	6.82	6.46	5.57	4.32	3.78	2078.9	5.7
30.0	4.24	4.82	5.73	6.19	6.47	6.92	6.89	6.77	6.55	5.77	4.55	4.00	2096.8	5.7
35.0	4.42	4.93	5.76	6.11	6.30	6.69	6.70	6.68	6.60	5.93	4.75	4.21	2102.0	5.8
40.0	4.57	5.01	5.76	5.99	6.09	6.43	6.47	6.56	6.60	6.05	4.92	4.38	2094.6	5.7
45.0	4.69	5.07	5.72	5.84	5.86	6.15	6.23	6.40	6.57	6.13	5.05	4.53	2076.8	5.7
50.0	4.78	5.09	5.65	5.67	5.61	5.85	5.95	6.20	6.49	6.17	5.16	4.64	2046.4	5.6
60.0	4.87	5.03	5.41	5.21	5.00	5.14	5.29	5.70	6.22	6.13	5.26	4.78	1949.0	5.3
70.0	4.83	4.86	5.05	4.65	4.30	4.33	4.53	5.07	5.80	5.94	5.22	4.79	1805.4	4.9
80.0	4.66	4.56	4.56	3.99	3.55	3.52	3.72	4.34	5.23	5.59	5.05	4.67	1624.8	4.5
90.0	4.37	4.15	3.97	3.25	2.78	2.67	2.88	3.51	4.54	5.09	4.74	4.42	1410.5	3.9

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: EAGLE  
CO  
LATITUDE: 39 DEGREES 39 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.38	3.40	4.73	6.09	7.11	7.90	7.52	6.57	5.57	4.12	2.74	2.18	1837.5	5.0
10.0	2.89	3.88	5.14	6.33	7.19	7.91	7.61	6.85	6.11	4.80	3.40	2.76	1975.2	5.4
15.0	3.12	4.09	5.30	6.40	7.16	7.84	7.58	6.92	6.32	5.10	3.69	3.03	2026.7	5.6
20.0	3.33	4.27	5.43	6.42	7.10	7.73	7.51	6.96	6.49	5.37	3.96	3.28	2066.1	5.7
25.0	3.52	4.43	5.53	6.41	6.99	7.57	7.39	6.95	6.63	5.60	4.21	3.50	2092.9	5.7
30.0	3.69	4.56	5.60	6.37	6.84	7.37	7.23	6.90	6.72	5.80	4.43	3.71	2107.1	5.8
35.0	3.83	4.66	5.63	6.28	6.66	7.12	7.03	6.81	6.77	5.96	4.62	3.89	2108.5	5.8
40.0	3.95	4.74	5.63	6.16	6.43	6.84	6.79	6.68	6.78	6.08	4.79	4.05	2097.2	5.7
45.0	4.05	4.78	5.59	6.01	6.19	6.54	6.53	6.52	6.74	6.16	4.92	4.17	2075.8	5.7
50.0	4.12	4.80	5.52	5.83	5.91	6.20	6.23	6.32	6.66	6.20	5.01	4.28	2041.7	5.6
60.0	4.18	4.74	5.28	5.36	5.27	5.44	5.54	5.81	6.39	6.16	5.11	4.39	1937.1	5.3
70.0	4.13	4.57	4.92	4.78	4.51	4.55	4.72	5.17	5.95	5.96	5.07	4.40	1786.6	4.9
80.0	3.98	4.28	4.45	4.09	3.71	3.68	3.86	4.41	5.37	5.61	4.90	4.28	1600.2	4.4
90.0	3.73	3.90	3.87	3.33	2.88	2.76	2.97	3.56	4.66	5.11	4.59	4.05	1381.0	3.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KMH/SQ. M)

SITE: GRAND JUNCTION CO  
LATITUDE: 39 DEGREES 7 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.50	3.52	4.89	6.26	7.50	8.19	7.77	6.88	5.78	4.24	2.90	2.31	1911.7	5.2
10.0	3.03	4.02	5.31	6.51	7.58	8.19	7.85	7.17	6.34	4.93	3.59	2.92	2054.4	5.6
15.0	3.27	4.24	5.48	6.57	7.55	8.12	7.82	7.25	6.56	5.24	3.90	3.21	2107.5	5.8
20.0	3.49	4.43	5.61	6.60	7.47	7.99	7.75	7.29	6.74	5.51	4.19	3.47	2147.8	5.9
25.0	3.69	4.59	5.71	6.58	7.36	7.82	7.62	7.28	6.88	5.74	4.46	3.71	2175.0	6.0
30.0	3.86	4.72	5.78	6.53	7.19	7.61	7.45	7.22	6.97	5.94	4.69	3.92	2189.0	6.0
35.0	4.02	4.83	5.81	6.44	6.99	7.35	7.24	7.13	7.02	6.10	4.89	4.11	2189.5	6.0
40.0	4.14	4.91	5.80	6.32	6.75	7.05	6.99	6.99	7.03	6.22	5.06	4.28	2177.1	6.0
45.0	4.24	4.95	5.77	6.16	6.49	6.73	6.71	6.81	6.99	6.30	5.20	4.41	2153.8	5.9
50.0	4.31	4.97	5.69	5.97	6.19	6.38	6.40	6.60	6.91	6.34	5.30	4.52	2117.3	5.8
60.0	4.38	4.90	5.44	5.48	5.50	5.57	5.67	6.05	6.61	6.29	5.40	4.64	2006.0	5.5
70.0	4.32	4.72	5.06	4.87	4.68	4.64	4.81	5.37	6.15	6.08	5.36	4.64	1846.9	5.1
80.0	4.16	4.42	4.57	4.16	3.82	3.72	3.92	4.56	5.54	5.72	5.17	4.51	1650.8	4.5
90.0	3.89	4.02	3.97	3.37	2.93	2.77	2.98	3.67	4.79	5.20	4.85	4.27	1420.6	3.9

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PUEBLO  
CO  
LATITUDE: 38 DEGREES 17 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.82	3.69	4.92	6.17	6.81	7.67	7.28	6.63	5.61	4.29	3.01	2.47	1869.4	5.1
10.0	3.44	4.21	5.33	6.40	6.87	7.66	7.34	6.89	6.11	4.96	3.71	3.12	2010.5	5.5
15.0	3.72	4.43	5.49	6.45	6.83	7.58	7.30	6.95	6.31	5.26	4.03	3.42	2063.4	5.7
20.0	3.97	4.62	5.62	6.47	6.76	7.46	7.22	6.98	6.47	5.52	4.32	3.69	2103.8	5.8
25.0	4.20	4.79	5.71	6.45	6.65	7.30	7.10	6.96	6.59	5.75	4.58	3.95	2131.6	5.8
30.0	4.41	4.93	5.77	6.39	6.50	7.09	6.94	6.90	6.67	5.94	4.81	4.17	2146.4	5.9
35.0	4.58	5.04	5.79	6.30	6.31	6.84	6.74	6.80	6.71	6.09	5.01	4.37	2148.2	5.9
40.0	4.73	5.11	5.78	6.17	6.10	6.57	6.50	6.66	6.70	6.20	5.18	4.54	2137.8	5.9
45.0	4.85	5.16	5.74	6.01	5.86	6.27	6.24	6.49	6.66	6.27	5.32	4.68	2116.1	5.8
50.0	4.93	5.17	5.66	5.82	5.59	5.94	5.95	6.28	6.57	6.30	5.42	4.79	2081.6	5.7
60.0	5.00	5.10	5.40	5.33	4.97	5.18	5.26	5.75	6.27	6.24	5.51	4.92	1975.2	5.4
70.0	4.94	4.90	5.01	4.73	4.24	4.33	4.47	5.09	5.82	6.02	5.45	4.91	1822.3	5.0
80.0	4.75	4.58	4.51	4.03	3.48	3.48	3.65	4.32	5.23	5.65	5.25	4.77	1632.8	4.5
90.0	4.44	4.15	3.91	3.26	2.69	2.61	2.79	3.47	4.51	5.13	4.91	4.50	1409.9	3.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: HARTFORD  
 CT  
 LATITUDE: 41 DEGREES 56 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.51	2.25	3.08	4.15	4.94	5.31	5.20	4.49	3.64	2.69	1.57	1.22	1220.1	3.3
10.0	1.78	2.52	3.30	4.29	4.99	5.32	5.25	4.65	3.93	3.06	1.87	1.47	1293.0	3.5
15.0	1.90	2.64	3.39	4.33	4.98	5.29	5.24	4.70	4.04	3.23	2.00	1.58	1319.4	3.6
20.0	2.01	2.74	3.45	4.34	4.95	5.23	5.20	4.71	4.13	3.37	2.13	1.69	1338.7	3.7
25.0	2.11	2.83	3.50	4.34	4.88	5.14	5.14	4.71	4.20	3.50	2.24	1.78	1350.7	3.7
30.0	2.20	2.90	3.53	4.30	4.79	5.03	5.04	4.58	4.25	3.60	2.33	1.87	1355.3	3.7
35.0	2.28	2.95	3.54	4.25	4.68	4.88	4.92	4.62	4.27	3.68	2.42	1.94	1352.6	3.7
40.0	2.34	2.99	3.53	4.17	4.54	4.72	4.77	4.54	4.26	3.74	2.49	2.01	1342.5	3.7
45.0	2.39	3.01	3.51	4.08	4.39	4.54	4.51	4.43	4.23	3.78	2.54	2.06	1326.0	3.6
50.0	2.42	3.01	3.46	3.96	4.22	4.34	4.43	4.31	4.18	3.80	2.58	2.10	1302.9	3.6
60.0	2.45	2.97	3.31	3.67	3.82	3.89	4.00	3.99	4.01	3.76	2.61	2.14	1236.0	3.4
70.0	2.41	2.86	3.09	3.31	3.35	3.37	3.50	3.60	3.75	3.64	2.58	2.12	1143.2	3.1
80.0	2.32	2.68	2.81	2.89	2.83	2.83	2.95	3.13	3.41	3.43	2.49	2.06	1029.3	2.8
90.0	2.18	2.45	2.48	2.43	2.31	2.27	2.40	2.61	2.99	3.14	2.33	1.95	878.1	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: WASHINGTON-STERLINDC  
LATITUDE: 38 DEGREES 57 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.80	2.53	3.54	4.61	5.42	5.99	5.73	5.10	4.22	3.17	2.05	1.52	1392.8	3.8
10.0	2.10	2.86	3.72	4.75	5.46	5.98	5.77	5.26	4.54	3.58	2.43	1.82	1472.4	4.0
15.0	2.24	2.98	3.87	4.78	5.43	5.93	5.74	5.30	4.66	3.76	2.60	1.95	1500.3	4.1
20.0	2.36	3.09	3.94	4.78	5.38	5.84	5.69	5.31	4.76	3.92	2.76	2.08	1515.9	4.2
25.0	2.47	3.18	3.99	4.76	5.29	5.73	5.60	5.29	4.83	4.05	2.90	2.19	1531.1	4.2
30.0	2.57	3.25	4.02	4.72	5.18	5.58	5.48	5.25	4.87	4.16	3.02	2.29	1533.7	4.2
35.0	2.65	3.30	4.02	4.65	5.04	5.40	5.33	5.17	4.88	4.25	3.13	2.38	1527.9	4.2
40.0	2.71	3.33	4.01	4.55	4.88	5.20	5.15	5.06	4.86	4.31	3.21	2.45	1513.9	4.1
45.0	2.76	3.35	3.97	4.44	4.70	4.99	4.96	4.94	4.82	4.34	3.28	2.50	1492.8	4.1
50.0	2.79	3.34	3.91	4.30	4.50	4.75	4.75	4.78	4.75	4.35	3.32	2.55	1463.6	4.0
60.0	2.80	3.28	3.72	3.96	4.04	4.20	4.25	4.40	4.53	4.29	3.35	2.58	1381.3	3.8
70.0	2.75	3.14	3.45	3.54	3.50	3.58	3.67	3.92	4.21	4.12	3.30	2.56	1269.7	3.5
80.0	2.63	2.93	3.12	3.06	2.93	2.96	3.06	3.38	3.79	3.86	3.17	2.47	1135.7	3.1
90.0	2.45	2.65	2.72	2.52	2.34	2.32	2.42	2.77	3.30	3.50	2.95	2.32	981.6	2.7



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KMH/SQ. M)

SITE: WILMINGTON DE  
LATITUDE: 39 DEGREES 40 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.80	2.61	3.62	4.67	5.39	5.94	5.75	5.10	4.15	3.10	2.03	1.54	1392.2	3.8
10.0	2.12	2.92	3.88	4.82	5.44	5.93	5.80	5.27	4.47	3.52	2.43	1.87	1475.9	4.0
15.0	2.26	3.05	3.98	4.85	5.42	5.89	5.78	5.31	4.60	3.70	2.60	2.01	1505.8	4.1
20.0	2.39	3.16	4.06	4.86	5.36	5.81	5.72	5.33	4.70	3.85	2.77	2.15	1527.3	4.2
25.0	2.51	3.26	4.11	4.85	5.28	5.69	5.63	5.31	4.77	3.99	2.91	2.27	1540.4	4.2
30.0	2.61	3.33	4.15	4.80	5.18	5.55	5.52	5.27	4.81	4.10	3.04	2.38	1544.9	4.2
35.0	2.69	3.39	4.16	4.74	5.04	5.38	5.37	5.19	4.83	4.19	3.15	2.48	1540.7	4.2
40.0	2.76	3.43	4.14	4.64	4.88	5.18	5.20	5.09	4.82	4.25	3.24	2.56	1528.1	4.2
45.0	2.82	3.45	4.11	4.53	4.71	4.97	5.01	4.97	4.78	4.29	3.31	2.62	1508.5	4.1
50.0	2.85	3.45	4.05	4.39	4.51	4.74	4.80	4.82	4.71	4.30	3.36	2.67	1480.6	4.1
60.0	2.88	3.39	3.86	4.05	4.05	4.21	4.30	4.44	4.50	4.24	3.40	2.72	1400.6	3.8
70.0	2.83	3.25	3.59	3.63	3.52	3.59	3.72	3.97	4.19	4.09	3.35	2.70	1290.6	3.5
80.0	2.71	3.04	3.25	3.14	2.95	2.98	3.11	3.42	3.78	3.83	3.22	2.62	1157.2	3.2
90.0	2.53	2.77	2.84	2.59	2.37	2.34	2.47	2.81	3.29	3.49	3.01	2.47	1002.9	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJH/SQ. M)

SITE: APALACHICOLA FL  
LATITUDE: 29 DEGREES 44 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.69	3.56	4.64	5.93	6.59	6.29	5.72	5.33	4.84	4.32	3.23	2.57	1697.1	4.6
10.0	3.03	3.87	4.87	6.02	6.53	6.18	5.66	5.40	5.09	4.77	3.75	2.97	1769.4	4.8
15.0	3.17	3.99	4.95	6.01	6.44	6.07	5.59	5.39	5.17	4.95	3.96	3.14	1790.8	4.9
20.0	3.30	4.09	5.00	5.97	6.31	5.92	5.49	5.36	5.22	5.10	4.15	3.30	1802.1	4.9
25.0	3.41	4.17	5.02	5.90	6.15	5.75	5.35	5.29	5.24	5.23	4.30	3.44	1803.3	4.9
30.0	3.50	4.23	5.01	5.80	5.96	5.54	5.19	5.20	5.24	5.32	4.44	3.55	1794.4	4.9
35.0	3.57	4.26	4.98	5.66	5.75	5.32	5.01	5.08	5.20	5.37	4.54	3.65	1776.7	4.9
40.0	3.62	4.27	4.91	5.50	5.50	5.07	4.81	4.93	5.14	5.40	4.62	3.72	1749.1	4.8
45.0	3.65	4.25	4.82	5.30	5.23	4.80	4.58	4.76	5.04	5.39	4.67	3.77	1711.7	4.7
50.0	3.65	4.21	4.71	5.08	4.93	4.50	4.33	4.56	4.92	5.36	4.69	3.80	1664.9	4.6
60.0	3.60	4.06	4.40	4.55	4.26	3.84	3.77	4.10	4.59	5.18	4.65	3.79	1544.3	4.2
70.0	3.47	3.81	3.99	3.93	3.54	3.18	3.17	3.56	4.16	4.88	4.49	3.69	1394.6	3.8
80.0	3.25	3.48	3.51	3.24	2.79	2.49	2.54	2.95	3.65	4.47	4.22	3.49	1218.9	3.3
90.0	2.96	3.08	2.96	2.54	2.08	1.88	1.95	2.34	3.07	3.96	3.85	3.22	1029.9	2.8

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: DAYTONA BEACH FL  
 LATITUDE: 29 DEGREES 11 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.02	3.83	4.88	5.94	6.20	5.75	5.63	5.30	4.65	3.95	3.26	2.74	1678.6	4.6
10.0	3.42	4.17	5.13	6.02	6.14	5.65	5.57	5.37	4.87	4.32	3.72	3.16	1751.0	4.8
15.0	3.59	4.31	5.21	6.01	6.05	5.55	5.49	5.36	4.95	4.47	3.92	3.35	1772.7	4.9
20.0	3.74	4.42	5.26	5.97	5.93	5.42	5.39	5.32	4.99	4.59	4.10	3.52	1784.4	4.9
25.0	3.87	4.51	5.28	5.89	5.78	5.26	5.25	5.25	5.01	4.69	4.25	3.67	1786.2	4.9
30.0	3.98	4.57	5.27	5.79	5.60	5.08	5.09	5.16	5.00	4.76	4.37	3.79	1778.2	4.9
35.0	4.06	4.60	5.23	5.65	5.40	4.88	4.92	5.04	4.96	4.80	4.47	3.89	1761.3	4.8
40.0	4.12	4.61	5.17	5.48	5.17	4.66	4.71	4.89	4.89	4.81	4.55	3.97	1734.6	4.8
45.0	4.16	4.59	5.07	5.28	4.92	4.41	4.49	4.71	4.79	4.80	4.59	4.02	1698.3	4.7
50.0	4.17	4.55	4.95	5.05	4.64	4.15	4.24	4.51	4.67	4.76	4.61	4.05	1652.6	4.5
60.0	4.11	4.38	4.61	4.52	4.01	3.56	3.69	4.05	4.36	4.59	4.56	4.04	1534.7	4.2
70.0	3.96	4.12	4.18	3.90	3.34	2.97	3.10	3.51	3.95	4.31	4.39	3.93	1388.0	3.8
80.0	3.71	3.76	3.67	3.21	2.65	2.35	2.49	2.91	3.46	3.94	4.12	3.72	1215.2	3.3
90.0	3.38	3.32	3.08	2.50	2.00	1.81	1.91	2.30	2.91	3.48	3.76	3.42	1029.1	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: JACKSONVILLE FL  
LATITUDE: 30 DEGREES 30 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.83	3.67	4.79	5.85	6.17	5.93	5.68	5.34	4.54	3.86	3.14	2.57	1655.1	4.5
10.0	3.22	4.02	5.05	5.95	6.12	5.84	5.63	5.43	4.77	4.24	3.60	2.99	1729.6	4.7
15.0	3.39	4.15	5.13	5.95	6.04	5.74	5.56	5.42	4.84	4.39	3.80	3.17	1752.6	4.8
20.0	3.53	4.27	5.19	5.91	5.93	5.61	5.46	5.39	4.89	4.52	3.98	3.33	1765.7	4.8
25.0	3.66	4.36	5.22	5.85	5.79	5.45	5.33	5.33	4.92	4.63	4.14	3.48	1769.0	4.8
30.0	3.77	4.42	5.22	5.75	5.61	5.27	5.18	5.24	4.91	4.70	4.27	3.60	1762.3	4.8
35.0	3.85	4.46	5.19	5.62	5.42	5.06	5.00	5.12	4.88	4.75	4.37	3.71	1747.0	4.8
40.0	3.91	4.47	5.13	5.46	5.20	4.84	4.80	4.98	4.82	4.77	4.45	3.79	1722.0	4.7
45.0	3.95	4.46	5.04	5.27	4.95	4.59	4.58	4.81	4.73	4.76	4.50	3.84	1687.5	4.6
50.0	3.96	4.43	4.92	5.05	4.68	4.32	4.34	4.61	4.62	4.73	4.52	3.88	1643.7	4.5
60.0	3.92	4.27	4.61	4.54	4.07	3.72	3.78	4.15	4.32	4.57	4.48	3.87	1529.5	4.2
70.0	3.78	4.03	4.19	3.93	3.41	3.10	3.19	3.61	3.93	4.31	4.34	3.78	1386.0	3.8
80.0	3.56	3.69	3.69	3.26	2.73	2.45	2.58	3.01	3.46	3.95	4.08	3.59	1216.6	3.3
90.0	3.25	3.27	3.12	2.56	2.07	1.88	1.98	2.39	2.92	3.51	3.73	3.31	1032.7	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MIAMI  
FL  
LATITUDE: 25 DEGREES 48 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	3.33	4.15	5.04	5.86	5.82	5.38	5.56	5.14	4.58	4.11	3.53	3.21	1695.3	4.6
10.0	3.73	4.48	5.26	5.90	5.72	5.25	5.47	5.17	4.76	4.45	3.97	3.67	1759.2	4.8
15.0	3.89	4.61	5.32	5.87	5.63	5.15	5.38	5.15	4.81	4.58	4.15	3.87	1776.6	4.9
20.0	4.04	4.72	5.36	5.81	5.50	5.01	5.26	5.09	4.83	4.68	4.32	4.04	1784.2	4.9
25.0	4.16	4.79	5.36	5.71	5.34	4.85	5.11	5.01	4.83	4.76	4.45	4.19	1781.9	4.9
30.0	4.26	4.84	5.33	5.59	5.17	4.68	4.94	4.91	4.80	4.81	4.57	4.32	1770.6	4.9
35.0	4.33	4.86	5.28	5.44	4.97	4.48	4.75	4.77	4.75	4.83	4.65	4.42	1749.6	4.8
40.0	4.38	4.85	5.19	5.26	4.74	4.26	4.54	4.62	4.66	4.83	4.71	4.49	1719.0	4.7
45.0	4.40	4.82	5.07	5.05	4.49	4.02	4.30	4.44	4.56	4.79	4.73	4.54	1679.0	4.6
50.0	4.40	4.75	4.93	4.81	4.22	3.77	4.05	4.24	4.43	4.73	4.73	4.56	1629.8	4.5
60.0	4.31	4.55	4.56	4.26	3.62	3.22	3.48	3.77	4.09	4.53	4.65	4.51	1506.2	4.1
70.0	4.12	4.24	4.10	3.63	3.00	2.66	2.90	3.24	3.68	4.22	4.45	4.36	1355.3	3.7
80.0	3.83	3.84	3.55	2.95	2.36	2.10	2.29	2.66	3.19	3.83	4.14	4.10	1180.4	3.2
90.0	3.46	3.35	2.94	2.26	1.79	1.64	1.75	2.07	2.65	3.35	3.74	3.74	995.0	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ORLANDO  
 FL  
 LATITUDE: 28 DEGREES 33 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.15	3.93	4.98	5.99	6.28	5.78	5.68	5.28	4.71	4.12	3.45	2.91	1712.0	4.7
10.0	3.56	4.27	5.23	6.07	6.20	5.66	5.61	5.34	4.94	4.51	3.94	3.37	1785.9	4.9
15.0	3.74	4.41	5.31	6.05	6.11	5.56	5.53	5.33	5.01	4.66	4.15	3.56	1808.0	5.0
20.0	3.89	4.52	5.36	6.01	5.99	5.43	5.42	5.29	5.05	4.79	4.34	3.74	1820.0	5.0
25.0	4.03	4.61	5.38	5.93	5.83	5.26	5.28	5.21	5.06	4.89	4.50	3.90	1821.7	5.0
30.0	4.14	4.67	5.37	5.82	5.65	5.08	5.12	5.12	5.05	4.96	4.63	4.03	1813.6	5.0
35.0	4.22	4.70	5.33	5.67	5.44	4.88	4.94	4.99	5.00	5.00	4.74	4.14	1796.2	4.9
40.0	4.28	4.71	5.26	5.50	5.20	4.65	4.73	4.84	4.93	5.01	4.81	4.22	1768.7	4.8
45.0	4.31	4.69	5.15	5.30	4.94	4.40	4.50	4.67	4.84	5.00	4.86	4.23	1731.4	4.7
50.0	4.32	4.64	5.02	5.06	4.65	4.13	4.25	4.47	4.71	4.95	4.88	4.31	1684.5	4.6
60.0	4.26	4.46	4.68	4.52	4.01	3.54	3.68	4.00	4.38	4.77	4.82	4.29	1563.6	4.3
70.0	4.10	4.18	4.24	3.89	3.33	2.94	3.09	3.46	3.97	4.48	4.65	4.17	1413.3	3.9
80.0	3.84	3.81	3.70	3.19	2.63	2.32	2.47	2.87	3.47	4.09	4.36	3.94	1236.5	3.4
90.0	3.49	3.36	3.10	2.48	1.97	1.79	1.88	2.26	2.90	3.61	3.96	3.62	1046.1	2.9

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: TALLAHASSEE FL  
LATITUDE: 30 DEGREES 23 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.76	3.59	4.65	5.75	6.11	5.93	5.51	5.28	4.70	4.16	3.18	2.56	1649.4	4.5
10.0	3.13	3.92	4.90	5.84	6.06	5.83	5.46	5.36	4.94	4.59	3.65	2.97	1724.3	4.7
15.0	3.29	4.05	4.98	5.84	5.98	5.74	5.40	5.36	5.02	4.77	3.85	3.15	1747.5	4.8
20.0	3.43	4.16	5.03	5.80	5.87	5.61	5.30	5.33	5.08	4.92	4.03	3.31	1760.9	4.8
25.0	3.55	4.24	5.06	5.74	5.73	5.45	5.18	5.26	5.10	5.04	4.19	3.45	1764.5	4.8
30.0	3.65	4.30	5.06	5.64	5.56	5.26	5.02	5.17	5.10	5.12	4.32	3.58	1758.1	4.8
35.0	3.73	4.34	5.02	5.51	5.37	5.06	4.86	5.06	5.06	5.18	4.43	3.68	1743.1	4.8
40.0	3.79	4.35	4.97	5.35	5.15	4.83	4.66	4.91	5.00	5.21	4.51	3.75	1718.6	4.7
45.0	3.82	4.34	4.88	5.17	4.90	4.58	4.45	4.75	4.91	5.21	4.56	3.81	1684.4	4.6
50.0	3.83	4.30	4.76	4.96	4.63	4.31	4.21	4.55	4.80	5.17	4.58	3.84	1641.0	4.5
60.0	3.79	4.15	4.46	4.45	4.03	3.71	3.68	4.10	4.48	5.01	4.54	3.84	1527.6	4.2
70.0	3.65	3.91	4.05	3.86	3.38	3.09	3.11	3.57	4.07	4.73	4.39	3.74	1385.0	3.8
80.0	3.43	3.58	3.57	3.20	2.70	2.45	2.51	2.97	3.58	4.33	4.14	3.55	1216.4	3.3
90.0	3.13	3.17	3.02	2.52	2.05	1.87	1.94	2.36	3.02	3.84	3.78	3.28	1033.2	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: TAMPA  
FL  
LATITUDE: 27 DEGREES 58 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.18	3.97	5.02	6.02	6.30	5.82	5.53	5.21	4.70	4.25	3.49	2.94	1717.6	4.7
10.0	3.59	4.31	5.26	6.09	6.22	5.70	5.46	5.27	4.91	4.64	3.97	3.39	1789.8	4.9
15.0	3.76	4.45	5.34	6.07	6.13	5.59	5.38	5.25	4.98	4.80	4.18	3.59	1811.0	5.0
20.0	3.92	4.56	5.39	6.02	6.00	5.46	5.27	5.21	5.02	4.93	4.36	3.76	1822.0	5.0
25.0	4.05	4.64	5.40	5.94	5.84	5.29	5.13	5.13	5.03	5.03	4.52	3.91	1822.9	5.0
30.0	4.15	4.70	5.39	5.82	5.65	5.10	4.97	5.03	5.01	5.10	4.65	4.04	1813.9	5.0
35.0	4.24	4.73	5.34	5.68	5.44	4.89	4.80	4.91	4.96	5.15	4.75	4.14	1795.6	4.9
40.0	4.29	4.73	5.27	5.50	5.20	4.66	4.59	4.76	4.89	5.16	4.83	4.22	1767.2	4.8
45.0	4.32	4.71	5.16	5.29	4.93	4.41	4.37	4.59	4.79	5.14	4.87	4.28	1729.0	4.7
50.0	4.33	4.66	5.03	5.06	4.64	4.13	4.12	4.39	4.66	5.09	4.88	4.30	1681.2	4.6
60.0	4.26	4.48	4.68	4.51	3.99	3.53	3.57	3.93	4.34	4.90	4.82	4.28	1558.8	4.3
70.0	4.09	4.19	4.23	3.87	3.31	2.92	3.00	3.39	3.92	4.59	4.64	4.15	1407.3	3.9
80.0	3.83	3.82	3.69	3.16	2.60	2.30	2.39	2.81	3.42	4.19	4.34	3.92	1229.6	3.4
90.0	3.48	3.36	3.08	2.45	1.94	1.77	1.83	2.21	2.86	3.68	3.95	3.59	1038.8	2.8



AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: WEST PALM BEACH FL  
 LATITUDE: 26 DEGREES 41 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.15	3.89	4.90	5.72	5.82	5.38	5.61	5.24	4.46	3.87	3.34	3.02	1655.7	4.5
10.0	3.53	4.21	5.12	5.77	5.73	5.26	5.53	5.28	4.64	4.18	3.76	3.45	1717.7	4.7
15.0	3.69	4.33	5.18	5.74	5.64	5.16	5.44	5.26	4.69	4.30	3.94	3.64	1734.7	4.8
20.0	3.83	4.42	5.22	5.69	5.52	5.03	5.33	5.21	4.72	4.40	4.09	3.80	1742.0	4.8
25.0	3.94	4.50	5.23	5.60	5.37	4.87	5.18	5.13	4.72	4.47	4.22	3.95	1739.8	4.8
30.0	4.04	4.54	5.20	5.49	5.19	4.70	5.02	5.02	4.70	4.52	4.33	4.07	1728.6	4.7
35.0	4.11	4.56	5.15	5.34	5.00	4.50	4.83	4.89	4.65	4.55	4.41	4.16	1708.3	4.7
40.0	4.16	4.56	5.07	5.17	4.78	4.29	4.61	4.74	4.57	4.54	4.47	4.23	1678.6	4.6
45.0	4.18	4.53	4.96	4.97	4.53	4.05	4.38	4.56	4.47	4.51	4.50	4.28	1639.8	4.5
50.0	4.18	4.47	4.83	4.74	4.26	3.80	4.12	4.35	4.35	4.46	4.50	4.30	1592.1	4.4
60.0	4.10	4.28	4.48	4.22	3.67	3.26	3.55	3.88	4.03	4.27	4.42	4.26	1472.0	4.0
70.0	3.92	4.00	4.03	3.61	3.05	2.70	2.97	3.34	3.63	3.99	4.23	4.12	1325.4	3.6
80.0	3.66	3.63	3.51	2.95	2.41	2.14	2.35	2.75	3.16	3.63	3.95	3.88	1155.0	3.2
90.0	3.31	3.18	2.92	2.28	1.83	1.66	1.80	2.15	2.63	3.18	3.58	3.54	974.2	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ATLANTA  
GA  
LATITUDE: 33 DEGREES 39 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.26	3.06	4.10	5.31	5.85	6.03	5.71	5.39	4.48	3.78	2.78	2.12	1549.2	4.2
10.0	2.57	3.36	4.34	5.43	5.83	5.96	5.70	5.51	4.75	4.21	3.23	2.49	1625.3	4.5
15.0	2.71	3.48	4.42	5.44	5.78	5.88	5.64	5.52	4.84	4.39	3.43	2.66	1650.0	4.5
20.0	2.83	3.58	4.48	5.43	5.69	5.77	5.56	5.50	4.91	4.55	3.61	2.81	1665.5	4.6
25.0	2.94	3.66	4.52	5.38	5.57	5.62	5.44	5.46	4.95	4.67	3.76	2.94	1671.8	4.6
30.0	3.03	3.72	4.53	5.30	5.43	5.45	5.30	5.38	4.96	4.77	3.90	3.05	1668.7	4.6
35.0	3.11	3.76	4.51	5.20	5.25	5.25	5.13	5.28	4.95	4.84	4.01	3.15	1656.7	4.5
40.0	3.16	3.78	4.47	5.07	5.06	5.03	4.94	5.14	4.90	4.88	4.10	3.23	1636.5	4.5
45.0	3.20	3.78	4.40	4.91	4.85	4.79	4.73	4.98	4.83	4.90	4.16	3.29	1607.3	4.4
50.0	3.21	3.75	4.31	4.73	4.60	4.53	4.50	4.80	4.73	4.88	4.19	3.33	1569.3	4.3
60.0	3.19	3.64	4.06	4.30	4.06	3.94	3.96	4.35	4.46	4.76	4.19	3.34	1467.9	4.0
70.0	3.10	3.45	3.73	3.78	3.44	3.31	3.37	3.82	4.09	4.52	4.08	3.28	1336.8	3.7
80.0	2.93	3.18	3.52	3.19	2.82	2.66	2.76	3.22	3.63	4.18	3.87	3.13	1182.2	3.2
90.0	2.69	2.85	2.84	2.57	2.18	2.05	2.14	2.59	3.10	3.74	3.56	2.91	1010.1	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: AUGUSTA  
GA  
LATITUDE: 33 DEGREES 22 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.36	3.21	4.22	5.46	5.88	6.00	5.68	5.26	4.44	3.85	2.89	2.27	1568.3	4.3
10.0	2.70	3.52	4.46	5.57	5.86	5.93	5.66	5.37	4.70	4.28	3.36	2.68	1647.1	4.5
15.0	2.85	3.65	4.54	5.59	5.81	5.85	5.61	5.38	4.79	4.46	3.57	2.86	1672.9	4.6
20.0	2.98	3.76	4.60	5.57	5.72	5.73	5.52	5.36	4.86	4.62	3.76	3.02	1689.5	4.6
25.0	3.10	3.85	4.64	5.52	5.60	5.59	5.40	5.32	4.89	4.75	3.92	3.17	1696.5	4.6
30.0	3.19	3.91	4.65	5.44	5.45	5.41	5.26	5.24	4.90	4.85	4.06	3.30	1694.1	4.6
35.0	3.27	3.96	4.63	5.33	5.27	5.21	5.09	5.13	4.89	4.92	4.18	3.40	1682.7	4.6
40.0	3.33	3.98	4.59	5.20	5.08	5.00	4.91	5.01	4.84	4.96	4.27	3.49	1662.9	4.6
45.0	3.37	3.98	4.52	5.04	4.86	4.76	4.69	4.85	4.77	4.97	4.34	3.55	1633.8	4.5
50.0	3.39	3.95	4.43	4.85	4.62	4.50	4.46	4.67	4.67	4.96	4.37	3.60	1595.7	4.4
60.0	3.37	3.83	4.17	4.40	4.06	3.91	3.93	4.23	4.39	4.83	4.37	3.62	1493.7	4.1
70.0	3.26	3.63	3.82	3.86	3.44	3.29	3.33	3.72	4.02	4.59	4.25	3.55	1361.5	3.7
80.0	3.09	3.35	3.40	3.25	2.81	2.64	2.73	3.13	3.57	4.24	4.03	3.39	1204.9	3.3
90.0	2.84	2.99	2.91	2.60	2.17	2.03	2.12	2.52	3.05	3.79	3.71	3.15	1030.4	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MACON  
GA  
LATITUDE: 32 DEGREES 42 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.42	3.22	4.29	5.48	5.94	6.05	5.62	5.42	4.53	3.93	2.96	2.29	1588.2	4.4
10.0	2.75	3.53	4.53	5.59	5.91	5.97	5.60	5.53	4.79	4.37	3.44	2.69	1665.6	4.6
15.0	2.90	3.65	4.62	5.60	5.85	5.89	5.54	5.54	4.89	4.55	3.65	2.86	1690.6	4.6
20.0	3.03	3.76	4.68	5.58	5.76	5.77	5.45	5.52	4.95	4.71	3.83	3.02	1706.1	4.7
25.0	3.14	3.84	4.71	5.53	5.63	5.62	5.33	5.46	4.98	4.84	4.00	3.16	1712.1	4.7
30.0	3.24	3.90	4.71	5.44	5.48	5.43	5.19	5.38	4.99	4.94	4.14	3.29	1708.5	4.7
35.0	3.32	3.94	4.69	5.33	5.30	5.23	5.02	5.27	4.97	5.01	4.25	3.39	1696.0	4.6
40.0	3.37	3.96	4.65	5.20	5.10	5.01	4.83	5.14	4.92	5.04	4.34	3.47	1674.8	4.6
45.0	3.41	3.95	4.58	5.03	4.88	4.77	4.62	4.97	4.85	5.05	4.40	3.53	1644.3	4.5
50.0	3.43	3.93	4.48	4.84	4.63	4.50	4.39	4.78	4.74	5.03	4.44	3.57	1604.8	4.4
60.0	3.40	3.80	4.21	4.38	4.06	3.90	3.86	4.33	4.46	4.90	4.43	3.58	1499.7	4.1
70.0	3.29	3.60	3.86	3.83	3.43	3.27	3.27	3.79	4.07	4.65	4.30	3.51	1364.6	3.7
80.0	3.11	3.31	3.42	3.22	2.79	2.61	2.68	3.18	3.61	4.29	4.07	3.35	1204.9	3.3
90.0	2.85	2.96	2.92	2.57	2.15	2.00	2.08	2.54	3.07	3.83	3.75	3.11	1028.1	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SAVANNAH  
LATITUDE: 32 DEGREES 8 MINUTES GA

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.50	3.29	4.40	5.55	5.84	5.81	5.62	5.12	4.29	3.84	2.96	2.37	1571.4	4.3
10.0	2.85	3.60	4.64	5.66	5.81	5.73	5.59	5.21	4.52	4.25	3.42	2.78	1646.1	4.5
15.0	3.00	3.73	4.73	5.67	5.75	5.65	5.53	5.21	4.60	4.42	3.63	2.95	1670.0	4.6
20.0	3.13	3.83	4.79	5.65	5.66	5.53	5.44	5.19	4.65	4.56	3.81	3.12	1684.6	4.6
25.0	3.25	3.91	4.82	5.59	5.53	5.38	5.32	5.14	4.68	4.67	3.96	3.26	1689.8	4.6
30.0	3.34	3.98	4.82	5.50	5.38	5.21	5.17	5.06	4.68	4.76	4.10	3.38	1685.6	4.6
35.0	3.42	4.01	4.80	5.39	5.20	5.02	5.00	4.95	4.66	4.82	4.21	3.49	1672.8	4.6
40.0	3.48	4.03	4.75	5.25	5.00	4.81	4.81	4.82	4.61	4.86	4.29	3.57	1651.3	4.5
45.0	3.52	4.02	4.67	5.07	4.78	4.57	4.60	4.67	4.53	4.86	4.35	3.63	1620.8	4.4
50.0	3.53	3.99	4.57	4.88	4.53	4.31	4.36	4.49	4.43	4.83	4.38	3.67	1581.3	4.3
60.0	3.50	3.87	4.29	4.41	3.97	3.74	3.83	4.06	4.16	4.69	4.35	3.68	1476.9	4.0
70.0	3.38	3.65	3.92	3.85	3.36	3.14	3.25	3.55	3.80	4.45	4.23	3.60	1343.5	3.7
80.0	3.19	3.36	3.47	3.22	2.73	2.52	2.64	2.99	3.36	4.09	3.99	3.43	1185.8	3.2
90.0	2.93	2.99	2.96	2.57	2.10	1.94	2.05	2.40	2.86	3.65	3.67	3.18	1011.9	2.8

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJH/SQ. M)

SITE: BARBERS POINT HI  
LATITUDE: 21 DEGREES 19 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.81	4.55	5.18	5.78	6.22	6.38	6.36	6.21	5.71	4.91	4.10	3.67	1913.4	5.2
10.0	4.21	4.86	5.34	5.77	6.06	6.16	6.20	6.20	5.91	5.27	4.56	4.13	1967.3	5.4
15.0	4.37	4.97	5.38	5.72	5.93	5.99	6.06	6.14	5.65	5.41	4.75	4.33	1977.6	5.4
20.0	4.51	5.06	5.39	5.63	5.76	5.80	5.89	6.05	5.97	5.51	4.91	4.50	1976.7	5.4
25.0	4.62	5.12	5.37	5.52	5.57	5.58	5.69	5.92	5.94	5.58	5.04	4.64	1965.3	5.4
30.0	4.71	5.14	5.31	5.37	5.36	5.33	5.47	5.77	5.89	5.62	5.14	4.76	1943.0	5.3
35.0	4.77	5.14	5.23	5.20	5.11	5.05	5.21	5.58	5.79	5.63	5.22	4.85	1909.8	5.2
40.0	4.80	5.11	5.12	5.00	4.84	4.75	4.93	5.36	5.67	5.60	5.26	4.91	1865.9	5.1
45.0	4.80	5.05	4.98	4.77	4.54	4.43	4.63	5.11	5.51	5.54	5.27	4.94	1811.6	5.0
50.0	4.78	4.96	4.82	4.52	4.23	4.08	4.30	4.83	5.33	5.45	5.25	4.93	1747.4	4.8
60.0	4.64	4.70	4.41	3.95	3.55	3.39	3.60	4.20	4.86	5.17	5.11	4.84	1594.0	4.4
70.0	4.40	4.34	3.91	3.31	2.86	2.65	2.88	3.50	4.30	4.77	4.84	4.63	1410.1	3.9
80.0	4.05	3.88	3.34	2.65	2.17	1.99	2.18	2.77	3.64	4.27	4.47	4.31	1207.1	3.3
90.0	3.62	3.34	2.71	1.98	1.63	1.63	1.63	2.03	2.92	3.67	3.99	3.90	1003.8	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KMH/SQ. M)

SITE: HILO  
LATITUDE: 19 DEGREES 43 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.53	3.93	4.24	4.52	4.89	5.23	5.12	5.02	4.87	4.33	3.48	3.21	1594.2	4.4
10.0	3.86	4.16	4.34	4.49	4.77	5.06	4.99	5.00	4.99	4.60	3.81	3.56	1631.2	4.5
15.0	3.99	4.24	4.36	4.45	4.67	4.93	4.88	4.94	5.02	4.69	3.94	3.70	1636.7	4.5
20.0	4.10	4.29	4.35	4.38	4.55	4.77	4.75	4.87	5.01	4.76	4.04	3.82	1633.4	4.5
25.0	4.19	4.32	4.32	4.29	4.40	4.60	4.60	4.76	4.98	4.81	4.13	3.92	1622.0	4.4
30.0	4.26	4.33	4.27	4.18	4.24	4.40	4.42	4.63	4.92	4.82	4.19	3.99	1601.9	4.4
35.0	4.30	4.32	4.20	4.04	4.06	4.18	4.22	4.48	4.83	4.81	4.23	4.05	1573.3	4.3
40.0	4.31	4.28	4.10	3.89	3.85	3.95	4.01	4.31	4.72	4.77	4.25	4.08	1536.4	4.2
45.0	4.30	4.22	3.98	3.72	3.63	3.69	3.77	4.11	4.58	4.71	4.24	4.09	1491.5	4.1
50.0	4.27	4.13	3.85	3.53	3.39	3.42	3.52	3.90	4.42	4.62	4.20	4.07	1438.9	3.9
60.0	4.12	3.90	3.52	3.11	2.90	2.88	2.99	3.41	4.03	4.36	4.06	3.97	1315.1	3.6
70.0	3.89	3.58	3.12	2.63	2.38	2.31	2.44	2.87	3.56	4.01	3.83	3.78	1167.5	3.2
80.0	3.57	3.19	2.67	2.15	1.87	1.81	1.91	2.31	3.03	3.57	3.52	3.50	1006.2	2.8
90.0	3.18	2.74	2.18	1.66	1.51	1.56	1.54	1.76	2.44	3.07	3.13	3.15	848.2	2.3

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: HONOLULU HI  
LATITUDE: 21 DEGREES 20 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.72	4.41	5.11	5.66	6.15	6.33	6.31	6.20	5.70	4.86	3.99	3.57	1887.3	5.2
10.0	4.11	4.70	5.27	5.65	5.99	6.11	6.15	6.19	5.90	5.22	4.43	4.01	1938.9	5.3
15.0	4.26	4.81	5.30	5.60	5.87	5.94	6.01	6.13	5.94	5.36	4.61	4.19	1948.3	5.3
20.0	4.40	4.89	5.31	5.52	5.70	5.75	5.84	6.04	5.95	5.46	4.77	4.35	1946.8	5.3
25.0	4.51	4.94	5.29	5.41	5.52	5.53	5.65	5.91	5.93	5.53	4.89	4.49	1934.9	5.3
30.0	4.59	4.96	5.24	5.27	5.31	5.29	5.43	5.76	5.87	5.57	4.99	4.60	1912.5	5.2
35.0	4.65	4.96	5.16	5.10	5.06	5.02	5.17	5.57	5.78	5.57	5.06	4.68	1879.3	5.1
40.0	4.67	4.93	5.05	4.90	4.80	4.72	4.90	5.35	5.66	5.55	5.10	4.73	1835.6	5.0
45.0	4.67	4.87	4.91	4.68	4.50	4.40	4.59	5.10	5.50	5.49	5.10	4.76	1781.8	4.9
50.0	4.65	4.78	4.75	4.44	4.19	4.05	4.27	4.82	5.32	5.40	5.08	4.76	1718.3	4.7
60.0	4.52	4.53	4.35	3.88	3.53	3.37	3.58	4.20	4.86	5.12	4.94	4.66	1566.8	4.3
70.0	4.28	4.18	3.86	3.26	2.84	2.64	2.87	3.56	4.29	4.73	4.69	4.46	1385.7	3.8
80.0	3.94	3.74	3.29	2.62	2.16	1.99	2.17	2.77	3.64	4.23	4.32	4.15	1185.9	3.2
90.0	3.52	3.22	2.67	1.96	1.63	1.63	1.63	2.03	2.92	3.64	3.86	3.75	986.2	2.7



AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: LIHUE HI  
 LATITUDE: 21 DEGREES 59 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.48	4.11	4.64	5.17	5.76	5.89	5.87	5.73	5.48	4.57	3.64	3.32	1754.7	4.8
10.0	3.84	4.38	4.78	5.16	5.62	5.70	5.73	5.73	5.67	4.90	4.02	3.72	1803.1	4.9
15.0	3.98	4.48	4.82	5.12	5.51	5.56	5.61	5.68	5.72	5.03	4.18	3.88	1812.4	5.0
20.0	4.11	4.55	4.82	5.05	5.36	5.39	5.47	5.60	5.73	5.12	4.31	4.03	1811.7	5.0
25.0	4.21	4.60	4.80	4.95	5.20	5.19	5.29	5.49	5.71	5.19	4.42	4.15	1801.6	4.9
30.0	4.29	4.62	4.76	4.83	5.01	4.97	5.09	5.35	5.66	5.23	4.51	4.25	1781.8	4.9
35.0	4.34	4.62	4.69	4.68	4.79	4.73	4.87	5.18	5.58	5.23	4.57	4.33	1752.2	4.8
40.0	4.36	4.59	4.59	4.51	4.55	4.47	4.62	4.98	5.46	5.21	4.60	4.38	1713.1	4.7
45.0	4.37	4.54	4.47	4.32	4.28	4.18	4.35	4.76	5.32	5.15	4.60	4.40	1664.7	4.6
50.0	4.34	4.46	4.42	4.10	4.00	3.87	4.06	4.51	5.14	5.07	4.58	4.40	1607.3	4.4
60.0	4.22	4.23	3.97	3.61	3.39	3.25	3.43	3.95	4.70	4.81	4.46	4.31	1469.9	4.0
70.0	4.00	3.90	3.54	3.06	2.77	2.59	2.79	3.32	4.17	4.45	4.23	4.13	1305.6	3.6
80.0	3.69	3.50	3.04	2.49	2.15	1.99	2.15	2.66	3.55	3.99	3.90	3.84	1123.0	3.1
90.0	3.30	3.03	2.49	1.90	1.64	1.62	1.63	1.99	2.87	3.45	3.49	3.48	938.1	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BURLINGTON  
IA  
LATITUDE: 40 DEGREES 47 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.83	2.71	3.67	4.85	5.92	6.68	6.58	5.77	4.46	3.34	2.10	1.52	1505.7	4.1
10.0	2.18	3.05	3.95	5.02	5.98	6.69	6.66	6.00	4.85	3.85	2.54	1.86	1603.9	4.4
15.0	2.34	3.20	4.06	5.06	5.97	6.64	6.64	6.07	5.01	4.07	2.74	2.02	1639.7	4.5
20.0	2.49	3.34	4.15	5.08	5.92	6.56	6.58	6.10	5.13	4.27	2.93	2.17	1666.1	4.6
25.0	2.62	3.45	4.21	5.07	5.83	6.44	6.49	6.10	5.23	4.44	3.10	2.30	1683.1	4.6
30.0	2.74	3.54	4.25	5.03	5.72	6.28	6.36	6.06	5.29	4.58	3.25	2.42	1690.3	4.6
35.0	2.84	3.61	4.27	4.96	5.57	6.08	6.20	5.98	5.32	4.70	3.38	2.52	1687.9	4.6
40.0	2.92	3.65	4.26	4.87	5.40	5.86	6.00	5.87	5.32	4.78	3.48	2.61	1475.7	4.6
45.0	2.98	3.69	4.23	4.76	5.21	5.62	5.78	5.74	5.29	4.84	3.57	2.68	1655.7	4.5
50.0	3.03	3.70	4.17	4.62	4.99	5.36	5.53	5.57	5.23	4.87	3.63	2.74	1626.5	4.5
60.0	3.06	3.65	3.99	4.27	4.49	4.74	4.95	5.14	5.01	4.83	3.69	2.80	1540.8	4.2
70.0	3.03	3.52	3.72	3.83	3.89	4.04	4.27	4.60	4.67	4.67	3.65	2.79	1420.8	3.9
80.0	2.91	3.30	3.38	3.32	3.26	3.33	3.55	3.96	4.23	4.40	3.53	2.71	1273.6	3.5
90.0	2.73	3.01	2.96	2.75	2.60	2.58	2.80	3.25	3.70	4.02	3.31	2.56	1102.8	3.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DES MOINES  
IA  
LATITUDE: 41 DEGREES 32 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.83	2.71	3.72	4.91	5.89	6.70	6.60	5.77	4.52	3.36	2.08	1.54	1512.3	4.1
10.0	2.21	3.08	4.01	5.10	5.96	6.71	6.69	6.02	4.93	3.90	2.54	1.91	1616.6	4.4
15.0	2.38	3.24	4.13	5.15	5.95	6.67	6.68	6.09	5.10	4.13	2.75	2.08	1655.3	4.5
20.0	2.53	3.37	4.22	5.17	5.90	6.59	6.63	6.13	5.23	4.34	2.95	2.24	1684.6	4.6
25.0	2.67	3.49	4.29	5.16	5.83	6.47	6.54	6.13	5.33	1.53	3.12	2.39	1704.2	4.7
30.0	2.80	3.59	4.34	5.13	5.72	6.32	6.42	6.09	5.41	4.68	3.28	2.52	1713.9	4.7
35.0	2.91	3.67	4.36	5.06	5.58	6.13	6.26	6.02	5.44	4.81	3.41	2.63	1713.7	4.7
40.0	3.00	3.73	4.36	4.97	5.40	5.91	6.06	5.92	5.45	4.90	3.53	2.73	1703.6	4.7
45.0	3.07	3.76	4.33	4.86	5.22	5.67	5.84	5.78	5.43	4.97	3.62	2.81	1685.1	4.6
50.0	3.12	3.77	4.28	4.72	5.00	5.41	5.60	5.62	5.37	5.00	3.69	2.88	1657.6	4.5
60.0	3.17	3.73	4.10	4.37	4.51	4.80	5.02	5.19	5.15	4.98	3.76	2.95	1574.4	4.3
70.0	3.13	3.60	3.83	3.93	3.92	4.10	4.35	4.66	4.82	4.82	3.73	2.95	1455.8	4.0
80.0	3.02	3.39	3.48	3.41	3.29	3.39	3.61	4.02	4.37	4.55	3.61	2.87	1308.4	3.6
90.0	2.84	3.09	3.06	2.84	2.64	2.64	2.86	3.31	3.83	4.17	3.39	2.72	1136.8	3.1

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MASON CITY IA  
LATITUDE: 43 DEGREES 9 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.75	2.64	3.68	4.79	5.97	6.66	6.57	5.78	4.42	3.18	1.90	1.40	1485.3	4.1
10.0	2.14	3.02	4.00	4.98	6.07	6.70	6.67	6.06	4.86	3.72	2.34	1.76	1593.6	4.4
15.0	2.31	3.18	4.12	5.04	6.06	6.66	6.67	6.14	5.03	3.96	2.54	1.93	1634.6	4.5
20.0	2.48	3.33	4.23	5.07	6.03	6.59	6.63	6.19	5.18	4.17	2.73	2.08	1666.2	4.6
25.0	2.62	3.46	4.30	5.07	5.96	6.49	6.56	6.20	5.29	4.35	2.90	2.22	1688.3	4.6
30.0	2.76	3.57	4.36	5.04	5.85	6.34	6.44	6.18	5.37	4.51	3.06	2.35	1700.6	4.7
35.0	2.87	3.65	4.39	4.99	5.72	6.16	6.29	6.12	5.42	4.64	3.19	2.47	1703.0	4.7
40.0	2.97	3.72	4.40	4.91	5.55	5.95	6.10	6.03	5.44	4.75	3.31	2.57	1695.5	4.6
45.0	3.05	3.76	4.38	4.80	5.36	5.72	5.89	5.90	5.42	4.82	3.40	2.65	1678.9	4.6
50.0	3.11	3.78	4.33	4.67	5.16	5.46	5.66	5.74	5.37	4.86	3.47	2.72	1654.0	4.5
60.0	3.17	3.75	4.17	4.34	4.66	4.88	5.10	5.33	5.18	4.85	3.55	2.79	1576.0	4.3
70.0	3.15	3.64	3.91	3.92	4.07	4.19	4.44	4.80	4.87	4.72	3.53	2.80	1462.2	4.0
80.0	3.06	3.43	3.57	3.42	3.42	3.48	3.71	4.17	4.44	4.47	3.43	2.74	1318.4	3.6
90.0	2.88	3.15	3.15	2.87	2.77	2.74	2.97	3.45	3.91	4.11	3.24	2.61	1150.7	3.2

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: SIOUX CITY  
 IA  
 LATITUDE: 42 DEGREES 24 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.80	2.65	3.68	4.97	5.99	6.70	6.69	5.81	4.48	3.27	2.03	1.48	1510.0	4.1
10.0	2.18	3.02	3.99	5.17	6.08	6.72	6.79	6.08	4.90	3.80	2.50	1.86	1617.7	4.4
15.0	2.36	3.18	4.11	5.23	6.07	6.69	6.78	6.16	5.07	4.04	2.72	2.03	1658.1	4.5
20.0	2.52	3.32	4.21	5.25	6.03	6.61	6.74	6.20	5.21	4.25	2.92	2.19	1689.1	4.6
25.0	2.66	3.44	4.28	5.25	5.96	6.50	6.65	6.21	5.32	4.44	3.10	2.34	1710.3	4.7
30.0	2.79	3.55	4.33	5.22	5.85	6.35	6.53	6.18	5.40	4.59	3.26	2.47	1721.6	4.7
35.0	2.91	3.63	4.36	5.16	5.71	6.17	6.37	6.12	5.44	4.72	3.40	2.59	1722.8	4.7
40.0	3.00	3.69	4.36	5.07	5.54	5.95	6.18	6.02	5.46	4.82	3.52	2.69	1714.1	4.7
45.0	3.08	3.72	4.34	4.96	5.35	5.71	5.96	5.89	5.43	4.89	3.62	2.77	1696.6	4.6
50.0	3.14	3.74	4.29	4.83	5.14	5.45	5.72	5.72	5.38	4.93	3.70	2.84	1670.3	4.6
60.0	3.19	3.71	4.12	4.48	4.63	4.86	5.14	5.30	5.18	4.91	3.77	2.92	1589.1	4.4
70.0	3.17	3.58	3.86	4.03	4.04	4.16	4.46	4.77	4.85	4.77	3.75	2.92	1472.0	4.0
80.0	3.06	3.37	3.51	3.51	3.39	3.44	3.71	4.13	4.42	4.51	3.64	2.85	1325.0	3.6
90.0	2.88	3.09	3.09	2.93	2.73	2.70	2.95	3.41	3.88	4.14	3.43	2.71	1153.8	3.2

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJH/SQ. M)

SITE: BOISE  
ID  
LATITUDE: 43 DEGREES 34 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.53	2.65	4.11	5.76	7.18	7.76	8.23	6.93	5.48	3.58	1.98	1.38	1724.7	4.7
10.0	1.85	3.04	4.50	6.04	7.32	7.82	8.41	7.32	6.11	4.26	2.48	1.74	1855.6	5.1
15.0	2.00	3.21	4.66	6.12	7.33	7.78	8.42	7.44	6.37	4.55	2.71	1.91	1904.9	5.2
20.0	2.13	3.36	4.79	6.17	7.29	7.71	8.38	7.52	6.59	4.82	2.92	2.07	1942.9	5.3
25.0	2.25	3.49	4.90	6.19	7.21	7.58	8.29	7.56	6.77	5.06	3.11	2.21	1969.1	5.4
30.0	2.36	3.61	4.97	6.17	7.09	7.41	8.15	7.54	6.91	5.27	3.28	2.34	1983.4	5.4
35.0	2.45	3.70	5.02	6.11	6.92	7.20	7.96	7.48	7.00	5.44	3.44	2.46	1985.6	5.4
40.0	2.53	3.77	5.03	6.02	6.72	6.95	7.72	7.38	7.05	5.58	3.57	2.56	1975.8	5.4
45.0	2.60	3.81	5.02	5.89	6.49	6.67	7.44	7.23	7.05	5.68	3.67	2.64	1954.8	5.4
50.0	2.64	3.83	4.97	5.74	6.23	6.36	7.13	7.04	7.01	5.74	3.76	2.71	1924.1	5.3
60.0	2.69	3.81	4.80	5.33	5.61	5.66	6.40	6.54	6.79	5.76	3.85	2.79	1828.2	5.0
70.0	2.67	3.70	4.51	4.81	4.88	4.83	5.52	5.88	6.39	5.62	3.85	2.80	1688.8	4.6
80.0	2.59	3.49	4.12	4.19	4.06	3.97	4.54	5.09	5.84	5.34	3.74	2.74	1512.7	4.1
90.0	2.44	3.21	3.64	3.48	3.23	3.07	3.55	4.18	5.14	4.92	3.54	2.61	1308.6	3.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LEWISTON  
LATITUDE: 46 DEGREES 23 MINUTES

ARRAY ALT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.07	1.92	3.21	4.52	5.81	6.35	7.36	6.09	4.52	2.71	1.30	0.90	1396.5	3.8
10.0	1.28	2.18	3.51	4.74	5.93	6.42	7.54	6.45	5.05	3.20	1.61	1.12	1495.6	4.1
15.0	1.37	2.30	3.63	4.81	5.94	6.40	7.57	6.58	5.27	3.42	1.75	1.22	1532.7	4.2
20.0	1.46	2.40	3.73	4.85	5.93	6.35	7.56	6.66	5.46	3.62	1.88	1.32	1561.5	4.3
25.0	1.53	2.49	3.81	4.86	5.87	6.27	7.50	6.70	5.61	3.79	2.00	1.41	1581.2	4.3
30.0	1.60	2.57	3.87	4.85	5.79	6.15	7.39	6.71	5.73	3.95	2.11	1.48	1591.8	4.4
35.0	1.66	2.63	3.91	4.81	5.68	6.00	7.24	6.67	5.82	4.08	2.20	1.55	1593.1	4.4
40.0	1.71	2.68	3.92	4.75	5.53	5.81	7.05	6.59	5.86	4.18	2.28	1.62	1585.1	4.3
45.0	1.75	2.71	3.91	4.66	5.35	5.60	6.82	6.48	5.88	4.26	2.35	1.67	1568.0	4.3
50.0	1.78	2.72	3.88	4.55	5.16	5.37	6.57	6.33	5.85	4.31	2.40	1.71	1543.5	4.2
60.0	1.81	2.71	3.76	4.26	4.71	4.85	5.96	5.92	5.69	4.33	2.46	1.76	1469.5	4.0
70.0	1.80	2.63	3.55	3.88	4.16	4.22	5.22	5.38	5.39	4.24	2.46	1.77	1362.3	3.7
80.0	1.74	2.49	3.27	3.42	3.54	3.55	4.38	4.72	4.97	4.05	2.40	1.73	1225.7	3.4
90.0	1.64	2.30	2.91	2.90	2.90	2.86	3.52	3.95	4.42	3.75	2.28	1.65	1068.5	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJH/SQ. M)

SITE: POCATELLO ID  
LATITUDE: 42 DEGREES 55 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.70	2.78	4.32	5.75	7.19	7.82	8.20	7.06	5.58	3.79	2.17	1.50	1764.1	4.8
10.0	2.07	3.19	4.73	6.01	7.32	7.87	8.36	7.45	6.22	4.50	2.73	1.90	1900.3	5.2
15.0	2.23	3.37	4.90	6.09	7.32	7.83	8.36	7.57	6.48	4.82	2.98	2.09	1951.8	5.3
20.0	2.39	3.53	5.04	6.14	7.28	7.75	8.32	7.65	6.70	5.10	3.22	2.26	1991.6	5.5
25.0	2.53	3.66	5.15	6.15	7.19	7.62	8.22	7.68	6.87	5.35	3.43	2.42	2019.3	5.5
30.0	2.65	3.78	5.22	6.12	7.07	7.44	8.07	7.66	7.01	5.57	3.63	2.56	2034.8	5.6
35.0	2.76	3.87	5.27	6.06	6.90	7.22	7.88	7.59	7.09	5.75	3.80	2.69	2037.8	5.6
40.0	2.85	3.94	5.29	5.97	6.69	6.96	7.63	7.48	7.14	5.90	3.94	2.80	2028.3	5.6
45.0	2.92	3.99	5.27	5.84	6.45	6.67	7.35	7.32	7.13	6.00	4.06	2.89	2007.7	5.5
50.0	2.98	4.01	5.22	5.68	6.19	6.37	7.05	7.13	7.09	6.07	4.16	2.97	1976.7	5.4
60.0	3.03	3.99	5.03	5.27	5.57	5.65	6.31	6.61	6.85	6.08	4.26	3.06	1879.0	5.1
70.0	3.01	3.86	4.73	4.75	4.83	4.81	5.43	5.93	6.44	5.93	4.26	3.07	1736.4	4.8
80.0	2.91	3.65	4.31	4.12	4.01	3.93	4.46	5.11	5.87	5.63	4.14	3.00	1556.3	4.3
90.0	2.74	3.34	3.80	3.42	3.18	3.03	3.47	4.19	5.16	5.18	3.91	2.85	1346.5	3.7



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CHICAGO  
LATITUDE: 41 DEGREES 47 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.60	2.39	3.49	4.61	5.64	6.33	6.13	5.42	4.26	3.06	1.79	1.27	1401.4	3.8
10.0	1.90	2.69	3.76	4.77	5.71	6.35	6.21	5.65	4.64	3.52	2.16	1.54	1489.7	4.1
15.0	2.03	2.82	3.86	4.82	5.70	6.31	6.20	5.71	4.79	3.72	2.32	1.66	1521.8	4.2
20.0	2.16	2.93	3.95	4.84	5.65	6.24	6.15	5.75	4.92	3.90	2.48	1.78	1545.3	4.2
25.0	2.27	3.03	4.01	4.83	5.58	6.13	6.07	5.75	5.01	4.05	2.61	1.88	1560.2	4.3
30.0	2.37	3.11	4.05	4.80	5.48	5.98	5.96	5.71	5.07	4.18	2.74	1.97	1566.2	4.3
35.0	2.45	3.17	4.07	4.74	5.34	5.81	5.81	5.65	5.11	4.29	2.84	2.05	1563.4	4.3
40.0	2.52	3.21	4.07	4.65	5.18	5.60	5.63	5.55	5.11	4.37	2.93	2.12	1551.7	4.3
45.0	2.58	3.24	4.04	4.55	5.00	5.38	5.43	5.42	5.08	4.42	3.00	2.18	1532.5	4.2
50.0	2.62	3.24	3.99	4.42	4.80	5.14	5.21	5.27	5.03	4.45	3.06	2.22	1505.4	4.1
60.0	2.65	3.20	3.82	4.09	4.34	4.57	4.69	4.88	4.83	4.42	3.10	2.26	1426.3	3.9
70.0	2.61	3.08	3.57	3.69	3.78	3.92	4.07	4.38	4.52	4.28	3.07	2.25	1316.0	3.6
80.0	2.52	2.90	3.25	3.21	3.18	3.26	3.40	3.79	4.10	4.03	2.97	2.19	1180.6	3.2
90.0	2.36	2.64	2.86	2.68	2.57	2.56	2.72	3.14	3.60	3.69	2.79	2.07	1024.3	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MCLINE  
 IL  
 LATITUDE: 41 DEGREES 27 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.69	2.56	3.52	4.61	5.53	6.21	6.11	5.41	4.28	3.14	1.88	1.37	1410.5	3.9
10.0	2.01	2.89	3.79	4.77	5.59	6.23	6.19	5.62	4.65	3.61	2.27	1.67	1501.5	4.1
15.0	2.16	3.03	3.90	4.81	5.58	6.19	6.17	5.69	4.80	3.81	2.45	1.81	1534.8	4.2
20.0	2.29	3.15	3.98	4.83	5.54	6.11	6.12	5.72	4.92	4.00	2.61	1.94	1559.5	4.3
25.0	2.41	3.26	4.04	4.82	5.46	6.00	6.04	5.71	5.01	4.16	2.76	2.05	1575.5	4.3
30.0	2.52	3.35	4.08	4.79	5.36	5.86	5.93	5.68	5.07	4.29	2.89	2.16	1582.5	4.3
35.0	2.61	3.42	4.10	4.73	5.23	5.69	5.78	5.61	5.10	4.40	3.00	2.25	1580.5	4.3
40.0	2.68	3.46	4.10	4.64	5.07	5.49	5.60	5.51	5.11	4.48	3.09	2.32	1569.6	4.3
45.0	2.74	3.49	4.07	4.53	4.89	5.27	5.40	5.39	5.08	4.54	3.17	2.39	1551.2	4.2
50.0	2.79	3.50	4.01	4.40	4.70	5.03	5.18	5.23	5.02	4.56	3.23	2.44	1524.5	4.2
60.0	2.82	3.46	3.85	4.08	4.24	4.48	4.65	4.84	4.82	4.53	3.28	2.49	1446.0	4.0
70.0	2.78	3.33	3.59	3.67	3.70	3.84	4.04	4.34	4.50	4.38	3.24	2.48	1335.7	3.7
80.0	2.68	3.13	3.26	3.19	3.11	3.19	3.37	3.76	4.08	4.13	3.13	2.41	1199.9	3.3
90.0	2.51	2.86	2.87	2.66	2.51	2.51	2.69	3.10	3.58	3.78	2.94	2.28	1042.6	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SPRINGFIELD IL  
LATITUDE: 39 DEGREES 50 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.84	2.72	3.60	4.77	5.88	6.61	6.48	5.69	4.58	3.37	2.14	1.55	1499.8	4.1
10.0	2.18	3.05	3.86	4.93	5.93	6.61	6.55	5.91	4.97	3.86	2.57	1.88	1592.7	4.4
15.0	2.33	3.19	3.96	4.97	5.91	6.55	6.52	5.97	5.12	4.07	2.76	2.03	1625.9	4.5
20.0	2.47	3.31	4.03	4.98	5.86	6.46	6.46	5.99	5.24	4.26	2.94	2.17	1650.0	4.5
25.0	2.59	3.42	4.09	4.97	5.77	6.34	6.37	5.98	5.34	4.42	3.10	2.30	1664.6	4.6
30.0	2.70	3.51	4.12	4.92	5.65	6.17	6.23	5.93	5.40	4.55	3.24	2.41	1669.8	4.6
35.0	2.79	3.57	4.13	4.85	5.50	5.98	6.06	5.85	5.42	4.66	3.36	2.51	1665.4	4.6
40.0	2.86	3.62	4.12	4.76	5.33	5.75	5.86	5.74	5.42	4.74	3.47	2.59	1651.6	4.5
45.0	2.92	3.64	4.08	4.64	5.13	5.52	5.65	5.60	5.38	4.79	3.55	2.66	1630.2	4.5
50.0	2.96	3.64	4.02	4.50	4.92	5.25	5.40	5.43	5.31	4.81	3.60	2.71	1599.7	4.4
60.0	2.99	3.58	3.84	4.15	4.41	4.64	4.82	5.00	5.08	4.76	3.65	2.76	1511.8	4.1
70.0	2.94	3.44	3.57	3.72	3.81	3.94	4.15	4.46	4.73	4.59	3.60	2.74	1390.7	3.8
80.0	2.82	3.22	3.23	3.22	3.18	3.24	3.44	3.83	4.27	4.31	3.47	2.66	1243.8	3.4
90.0	2.64	2.93	2.83	2.66	2.53	2.51	2.70	3.13	3.72	3.93	3.25	2.50	1074.1	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: EVANSVILLE IN  
LATITUDE: 38 DEGREES 3 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.81	2.59	3.62	4.73	5.62	6.25	6.05	5.48	4.42	3.43	2.15	1.58	1453.9	4.0
10.0	2.09	2.87	3.86	4.87	5.65	6.23	6.09	5.66	4.75	3.89	2.54	1.87	1534.2	4.2
15.0	2.22	2.99	3.95	4.90	5.62	6.17	6.05	5.70	4.88	4.08	2.71	2.01	1561.7	4.3
20.0	2.33	3.09	4.02	4.90	5.55	6.07	5.99	5.71	4.98	4.25	2.87	2.13	1580.6	4.3
25.0	2.43	3.17	4.06	4.88	5.46	5.94	5.89	5.68	5.05	4.40	3.01	2.24	1590.6	4.4
30.0	2.52	3.24	4.09	4.83	5.34	5.78	5.75	5.63	5.09	4.52	3.14	2.34	1591.7	4.4
35.0	2.59	3.29	4.09	4.75	5.20	5.59	5.59	5.54	5.10	4.61	3.24	2.42	1583.9	4.3
40.0	2.65	3.32	4.07	4.65	5.02	5.38	5.40	5.43	5.08	4.68	3.33	2.49	1567.9	4.3
45.0	2.69	3.33	4.02	4.53	4.84	5.15	5.19	5.28	5.03	4.71	3.39	2.55	1544.2	4.2
50.0	2.72	3.32	3.96	4.38	4.62	4.89	4.96	5.11	4.95	4.72	3.44	2.59	1512.0	4.1
60.0	2.73	3.25	3.76	4.03	4.13	4.31	4.42	4.69	4.72	4.65	3.46	2.62	1423.0	3.9
70.0	2.67	3.10	3.49	3.59	3.56	3.65	3.79	4.17	4.37	4.46	3.40	2.59	1303.6	3.6
80.0	2.54	2.89	3.14	3.09	2.97	3.00	3.14	3.56	3.93	4.17	3.25	2.49	1161.5	3.2
90.0	2.36	2.61	2.73	2.54	2.35	2.33	2.46	2.90	3.40	3.78	3.03	2.34	998.9	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: FORT WAYNE  
LATITUDE: 41 DEGREES 0 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY ALT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.44	2.20	3.09	4.29	5.27	5.80	5.63	5.02	4.01	2.91	1.63	1.17	1294.2	3.5
10.0	1.66	2.44	3.30	4.43	5.33	5.81	5.69	5.21	4.33	3.32	1.92	1.38	1365.9	3.7
15.0	1.77	2.55	3.38	4.46	5.31	5.77	5.67	5.26	4.46	3.49	2.06	1.47	1390.9	3.8
20.0	1.86	2.64	3.45	4.48	5.27	5.70	5.63	5.28	4.56	3.65	2.18	1.56	1408.4	3.9
25.0	1.94	2.71	3.49	4.46	5.20	5.59	5.55	5.27	4.64	3.78	2.29	1.64	1418.2	3.9
30.0	2.01	2.77	3.52	4.43	5.10	5.46	5.44	5.23	4.69	3.89	2.38	1.71	1420.2	3.9
35.0	2.07	2.82	3.52	4.37	4.97	5.30	5.30	5.17	4.71	3.98	2.46	1.77	1414.4	3.5
40.0	2.12	2.85	3.51	4.29	4.82	5.11	5.14	5.07	4.70	4.04	2.53	1.82	1400.8	3.8
45.0	2.15	2.86	3.48	4.19	4.65	4.91	4.96	4.95	4.67	4.08	2.58	1.86	1381.0	3.8
50.0	2.18	2.86	3.43	4.07	4.46	4.69	4.75	4.81	4.61	4.10	2.62	1.89	1353.9	3.7
60.0	2.19	2.81	3.28	3.76	4.02	4.18	4.28	4.44	4.42	4.06	2.64	1.91	1278.2	3.5
70.0	2.15	2.69	3.05	3.38	3.51	3.60	3.72	3.99	4.12	3.92	2.61	1.89	1175.8	3.2
80.0	2.06	2.52	2.77	2.94	2.96	3.00	3.12	3.46	3.73	3.68	2.51	1.83	1052.2	2.9
90.0	1.92	2.30	2.44	2.46	2.39	2.37	2.51	2.86	3.27	3.36	2.35	1.72	910.9	2.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: INDIANAPOLIS IN  
 LATITUDE: 39 DEGREES 44 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.56	2.35	3.26	4.41	5.33	5.89	5.69	5.18	4.17	3.08	1.83	1.32	1343.4	3.7
10.0	1.81	2.61	3.48	4.55	5.37	5.89	5.74	5.36	4.50	3.50	2.16	1.56	1417.3	3.9
15.0	1.91	2.72	3.57	4.58	5.35	5.84	5.72	5.41	4.63	3.67	2.31	1.66	1442.9	4.0
20.0	2.01	2.81	3.63	4.59	5.30	5.76	5.66	5.43	4.73	3.83	2.44	1.76	1460.6	4.0
25.0	2.10	2.89	3.67	4.57	5.22	5.65	5.58	5.41	4.80	3.97	2.56	1.85	1470.3	4.0
30.0	2.17	2.95	3.70	4.53	5.11	5.51	5.46	5.37	4.84	4.08	2.67	1.93	1471.8	4.0
35.0	2.24	3.00	3.70	4.47	4.98	5.34	5.32	5.29	4.86	4.16	2.76	2.00	1465.3	4.0
40.0	2.29	3.03	3.68	4.38	4.82	5.14	5.15	5.19	4.85	4.23	2.83	2.06	1450.7	4.0
45.0	2.32	3.04	3.65	4.27	4.65	4.94	4.96	5.06	4.81	4.26	2.89	2.10	1429.8	3.9
50.0	2.35	3.04	3.59	4.14	4.46	4.71	4.75	4.91	4.75	4.27	2.93	2.13	1401.1	3.8
60.0	2.35	2.98	3.42	3.82	4.01	4.18	4.26	4.52	4.53	4.22	2.95	2.16	1321.1	3.6
70.0	2.31	2.85	3.18	3.43	3.48	3.58	3.69	4.04	4.22	4.06	2.91	2.13	1213.4	3.3
80.0	2.20	2.66	2.88	2.97	2.92	2.97	3.08	3.48	3.81	3.81	2.79	2.06	1084.3	3.0
90.0	2.05	2.42	2.52	2.46	2.35	2.34	2.46	2.86	3.32	3.47	2.61	1.94	936.5	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SOUTH BEND  
IN  
LATITUDE: 41 DEGREES 42 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.31	2.08	3.12	4.38	5.43	6.06	5.84	5.26	4.06	2.86	1.57	1.08	1312.4	3.6
10.0	1.51	2.30	3.35	4.53	5.49	6.08	5.91	5.47	4.41	3.27	1.86	1.26	1385.2	3.8
15.0	1.60	2.40	3.43	4.57	5.48	6.04	5.90	5.53	4.54	3.45	1.99	1.35	1410.6	3.9
20.0	1.68	2.48	3.50	4.59	5.44	5.97	5.85	5.56	4.65	3.61	2.11	1.43	1428.2	3.9
25.0	1.75	2.55	3.55	4.58	5.36	5.86	5.78	5.56	4.74	3.75	2.22	1.50	1438.0	3.9
30.0	1.81	2.61	3.58	4.55	5.26	5.73	5.67	5.52	4.79	3.86	2.32	1.56	1439.8	3.9
35.0	1.87	2.65	3.59	4.49	5.14	5.56	5.53	5.46	4.82	3.95	2.40	1.61	1433.7	3.9
40.0	1.91	2.68	3.58	4.41	4.98	5.36	5.36	5.36	4.82	4.02	2.47	1.66	1419.7	3.9
45.0	1.94	2.69	3.55	4.31	4.81	5.15	5.17	5.24	4.79	4.06	2.52	1.69	1399.0	3.8
50.0	1.96	2.69	3.50	4.18	4.62	4.92	4.96	5.09	4.74	4.08	2.56	1.72	1371.4	3.8
60.0	1.96	2.64	3.35	3.88	4.17	4.39	4.47	4.71	4.55	4.05	2.58	1.74	1293.9	3.5
70.0	1.93	2.54	3.13	3.49	3.64	3.78	3.89	4.23	4.25	3.91	2.55	1.72	1189.2	3.3
80.0	1.85	2.38	2.85	3.04	3.07	3.14	3.26	3.67	3.86	3.68	2.46	1.66	1062.7	2.9
90.0	1.72	2.17	2.51	2.54	2.48	2.48	2.62	3.04	3.39	3.37	2.30	1.56	918.6	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DODGE CITY KS  
LATITUDE: 37 DEGREES 46 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.61	3.54	4.65	5.94	6.59	7.44	7.44	6.48	5.32	4.10	2.82	2.31	1797.8	4.9
10.0	3.13	4.01	5.02	6.15	6.63	7.41	7.29	6.71	5.77	4.71	3.42	2.87	1921.7	5.3
15.0	3.36	4.21	5.16	6.19	6.60	7.33	7.25	6.77	5.94	4.98	3.69	3.12	1966.9	5.4
20.0	3.58	4.38	5.26	6.21	6.52	7.22	7.16	6.79	6.08	5.21	3.94	3.36	2000.5	5.5
25.0	3.77	4.53	5.34	6.18	6.41	7.05	7.04	6.77	6.19	5.41	4.16	3.57	2022.1	5.5
30.0	3.94	4.65	5.39	6.12	6.26	6.85	6.87	6.71	6.25	5.58	4.36	3.76	2031.7	5.6
35.0	4.08	4.74	5.40	6.03	6.08	6.61	6.67	6.61	6.28	5.71	4.53	3.93	2029.2	5.6
40.0	4.20	4.81	5.39	5.90	5.87	6.34	6.43	6.47	6.26	5.81	4.67	4.07	2015.6	5.5
45.0	4.29	4.84	5.34	5.75	5.64	6.06	6.17	6.30	6.21	5.87	4.78	4.19	1991.3	5.5
50.0	4.36	4.85	5.26	5.56	5.38	5.74	5.88	6.09	6.12	5.89	4.86	4.28	1955.1	5.4
60.0	4.40	4.77	5.01	5.09	4.78	5.00	5.20	5.57	5.83	5.82	4.92	4.37	1848.5	5.1
70.0	4.34	4.57	4.64	4.51	4.08	4.18	4.41	4.92	5.40	5.60	4.86	4.35	1699.3	4.7
80.0	4.16	4.27	4.17	3.84	3.35	3.36	3.59	4.17	4.85	5.24	4.66	4.22	1517.2	4.2
90.0	3.88	3.86	3.61	3.11	2.60	2.53	2.73	3.35	4.18	4.75	4.35	3.97	1305.2	3.6



AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: GOODLAND KS  
LATITUDE: 39 DEGREES 22 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.49	3.33	4.49	5.77	6.50	7.42	7.31	6.45	5.17	4.00	2.70	2.19	1761.6	4.8
10.0	3.03	3.78	4.86	5.98	6.56	7.42	7.38	6.71	5.64	4.63	3.33	2.77	1891.6	5.2
15.0	3.28	3.98	5.00	6.04	6.54	7.36	7.36	6.78	5.82	4.91	3.61	3.03	1940.2	5.3
20.0	3.50	4.15	5.11	6.06	6.48	7.25	7.29	6.82	5.97	5.16	3.87	3.28	1977.3	5.4
25.0	3.70	4.30	5.20	6.05	6.38	7.10	7.17	6.81	6.08	5.37	4.11	3.50	2002.6	5.5
30.0	3.88	4.42	5.25	6.00	6.24	6.91	7.02	6.76	6.16	5.56	4.32	3.70	2015.9	5.5
35.0	4.04	4.52	5.28	5.91	6.07	6.68	6.82	6.67	6.20	5.70	4.50	3.88	2017.1	5.5
40.0	4.17	4.59	5.27	5.80	5.87	6.42	6.58	6.54	6.19	5.81	4.65	4.03	2006.6	5.5
45.0	4.27	4.63	5.23	5.66	5.65	6.14	6.33	6.38	6.16	5.88	4.77	4.16	1986.2	5.4
50.0	4.34	4.64	5.16	5.48	5.40	5.83	6.04	6.18	6.08	5.92	4.86	4.26	1953.9	5.4
60.0	4.41	4.58	4.93	5.04	4.82	5.12	5.37	5.67	5.81	5.87	4.95	4.37	1854.7	5.1
70.0	4.36	4.41	4.59	4.49	4.14	4.30	4.58	5.04	5.41	5.67	4.91	4.37	1712.3	4.7
80.0	4.20	4.13	4.15	3.85	3.43	3.49	3.75	4.30	4.88	5.33	4.73	4.25	1535.9	4.2
90.0	3.93	3.75	3.61	3.14	2.69	2.65	2.89	3.48	4.23	4.86	4.44	4.02	1328.5	3.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: TOPEKA KS  
 LATITUDE: 39 DEGREES 4 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.15	2.96	3.96	5.18	6.04	6.71	6.71	6.02	4.78	3.61	2.44	1.84	1596.6	4.4
10.0	2.56	3.33	4.25	5.35	6.09	6.70	6.77	6.25	5.13	4.14	2.95	2.26	1700.8	4.7
15.0	2.74	3.49	4.36	5.39	6.06	6.64	6.74	6.30	5.34	4.37	3.18	2.46	1738.6	4.8
20.0	2.91	3.63	4.45	5.41	6.00	6.54	6.68	6.33	5.46	4.57	3.39	2.63	1766.4	4.8
25.0	3.06	3.75	4.51	5.39	5.91	6.41	6.57	6.31	5.55	4.75	3.58	2.79	1784.0	4.9
30.0	3.19	3.84	4.55	5.34	5.78	6.24	6.43	6.26	5.61	4.89	3.75	2.94	1791.3	4.9
35.0	3.31	3.91	4.56	5.26	5.63	6.04	6.25	6.17	5.64	5.01	3.90	3.06	1788.1	4.9
40.0	3.40	3.96	4.55	5.16	5.44	5.80	6.04	6.05	5.63	5.09	4.02	3.17	1775.0	4.9
45.0	3.47	3.99	4.51	5.03	5.24	5.56	5.81	5.90	5.59	5.14	4.11	3.25	1753.3	4.8
50.0	3.52	3.99	4.44	4.87	5.01	5.28	5.54	5.71	5.51	5.16	4.18	3.32	1721.5	4.7
60.0	3.56	3.93	4.23	4.48	4.48	4.65	4.94	5.25	5.26	5.11	4.24	3.39	1628.7	4.5
70.0	3.50	3.77	3.94	4.00	3.86	3.94	4.23	4.67	4.89	4.92	4.19	3.37	1499.3	4.1
80.0	3.36	3.52	3.55	3.44	3.21	3.22	3.48	3.99	4.41	4.62	4.03	3.27	1341.8	3.7
90.0	3.14	3.20	3.10	2.83	2.53	2.48	2.71	3.24	3.83	4.20	3.77	3.02	1158.7	3.2

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: WICHITA KS  
LATITUDE: 37 DEGREES 39 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.47	3.34	4.42	5.62	6.42	7.14	7.06	6.41	5.09	3.94	2.75	2.18	1731.4	4.7
10.0	2.94	3.76	4.75	5.80	6.46	7.12	7.10	6.64	5.51	4.50	3.32	2.68	1845.0	5.1
15.0	3.15	3.93	4.83	5.84	6.42	7.04	7.06	6.70	5.67	4.75	3.58	2.91	1885.9	5.2
20.0	3.35	4.09	4.98	5.85	6.35	6.93	6.98	6.71	5.79	4.96	3.81	3.11	1915.8	5.2
25.0	3.52	4.22	5.04	5.83	6.24	6.77	6.86	6.69	5.88	5.15	4.02	3.31	1934.4	5.3
30.0	3.67	4.33	5.08	5.77	6.10	6.58	6.70	6.63	5.94	5.30	4.21	3.48	1941.7	5.3
35.0	3.80	4.41	5.09	5.68	5.92	6.35	6.50	6.53	5.96	5.42	4.37	3.62	1937.5	5.3
40.0	3.90	4.46	5.08	5.56	5.72	6.10	6.27	6.39	5.94	5.51	4.50	3.75	1922.9	5.3
45.0	3.98	4.49	5.03	5.41	5.50	5.83	6.02	6.22	5.89	5.56	4.61	3.85	1898.2	5.2
50.0	4.04	4.49	4.95	5.23	5.24	5.52	5.73	6.01	5.80	5.57	4.68	3.93	1862.3	5.1
60.0	4.07	4.41	4.71	4.79	4.66	4.82	5.07	5.50	5.53	5.50	4.73	4.00	1758.4	4.8
70.0	4.00	4.22	4.36	4.25	3.98	4.05	4.30	4.86	5.12	5.29	4.67	3.98	1614.7	4.4
80.0	3.83	3.94	3.92	3.63	3.28	3.27	3.51	4.12	4.59	4.94	4.48	3.85	1440.4	3.9
90.0	3.57	3.56	3.40	2.95	2.54	2.48	2.68	3.31	3.96	4.48	4.18	3.62	1238.4	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LEXINGTON  
KY  
LATITUDE: 38 DEGREES 2 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.72	2.46	3.46	4.66	5.50	5.98	5.84	5.32	4.29	3.29	2.07	1.53	1405.2	3.8
10.0	1.98	2.71	3.68	4.79	5.53	5.96	5.87	5.48	4.60	3.72	2.44	1.81	1479.9	4.1
15.0	2.09	2.82	3.76	4.82	5.50	5.90	5.84	5.52	4.72	3.90	2.60	1.94	1505.3	4.1
20.0	2.19	2.91	3.83	4.82	5.44	5.81	5.77	5.53	4.81	4.06	2.75	2.06	1522.4	4.2
25.0	2.28	2.98	3.87	4.80	5.35	5.69	5.68	5.51	4.88	4.20	2.88	2.16	1531.1	4.2
30.0	2.36	3.04	3.89	4.75	5.24	5.54	5.55	5.45	4.91	4.31	3.00	2.25	1531.3	4.2
35.0	2.43	3.08	3.89	4.68	5.09	5.36	5.39	5.37	4.92	4.39	3.09	2.33	1523.0	4.2
40.0	2.48	3.10	3.86	4.58	4.92	5.15	5.21	5.26	4.90	4.45	3.17	2.40	1507.0	4.1
45.0	2.51	3.11	3.82	4.46	4.74	4.94	5.01	5.12	4.85	4.48	3.23	2.45	1483.6	4.1
50.0	2.53	3.10	3.76	4.31	4.53	4.70	4.79	4.95	4.78	4.48	3.27	2.48	1452.1	4.0
60.0	2.53	3.03	3.57	3.96	4.05	4.14	4.27	4.54	4.55	4.41	3.29	2.51	1365.8	3.7
70.0	2.47	2.89	3.31	3.54	3.50	3.53	3.67	4.04	4.21	4.23	3.23	2.48	1250.8	3.4
80.0	2.36	2.69	2.98	3.04	2.92	2.90	3.05	3.46	3.79	3.96	3.09	2.39	1114.3	3.1
90.0	2.19	2.43	2.60	2.51	2.32	2.27	2.40	2.82	3.28	3.59	2.88	2.24	958.6	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LOUISVILLE KY  
LATITUDE: 38 DEGREES 11 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.72	2.49	3.47	4.63	5.42	6.00	5.79	5.30	4.29	3.28	2.06	1.54	1401.1	3.8
10.0	1.98	2.75	3.69	4.76	5.45	5.98	5.82	5.47	4.60	3.71	2.42	1.83	1476.6	4.0
15.0	2.10	2.86	3.78	4.79	5.42	5.93	5.79	5.51	4.72	3.89	2.58	1.96	1502.4	4.1
20.0	2.20	2.95	3.34	4.79	5.37	5.84	5.73	5.52	4.82	4.05	2.73	2.07	1520.0	4.2
25.0	2.29	3.03	3.88	4.77	5.28	5.72	5.63	5.50	4.88	4.19	2.86	2.18	1529.1	4.2
30.0	2.37	3.09	3.90	4.72	5.16	5.56	5.51	5.44	4.92	4.30	2.98	2.28	1529.8	4.2
35.0	2.44	3.13	3.90	4.64	5.02	5.38	5.36	5.36	4.93	4.38	3.08	2.36	1521.9	4.2
40.0	2.49	3.16	3.88	4.55	4.86	5.18	5.18	5.25	4.91	4.44	3.15	2.42	1506.3	4.1
45.0	2.53	3.17	3.84	4.43	4.68	4.96	4.98	5.11	4.86	4.47	3.21	2.48	1483.4	4.1
50.0	2.55	3.16	3.78	4.29	4.47	4.72	4.76	4.95	4.79	4.48	3.25	2.51	1452.3	4.0
60.0	2.55	3.09	3.59	3.94	4.00	4.17	4.25	4.54	4.56	4.41	3.28	2.54	1366.9	3.7
70.0	2.49	2.95	3.33	3.52	3.46	3.55	3.66	4.04	4.22	4.23	3.22	2.51	1252.7	3.4
80.0	2.38	2.74	3.00	3.03	2.89	2.92	3.04	3.46	3.80	3.95	3.08	2.42	1116.9	3.1
90.0	2.21	2.48	2.61	2.50	2.30	2.28	2.40	2.82	3.29	3.59	2.87	2.27	961.7	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BATON ROUGE  
LA  
LATITUDE: 30 DEGREES 32 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.47	3.33	4.35	5.30	5.89	6.07	5.50	5.29	4.61	4.11	2.89	2.32	1587.4	4.3
10.0	2.78	3.62	4.56	5.38	5.85	5.97	5.45	5.37	4.85	4.53	3.30	2.67	1654.3	4.5
15.0	2.91	3.74	4.64	5.38	5.78	5.87	5.39	5.37	4.93	4.70	3.47	2.82	1674.1	4.6
20.0	3.03	3.83	4.68	5.35	5.67	5.74	5.29	5.34	4.98	4.85	3.63	2.96	1684.8	4.5
25.0	3.13	3.91	4.71	5.28	5.54	5.58	5.17	5.28	5.00	4.97	3.76	3.08	1686.1	4.6
30.0	3.21	3.96	4.70	5.19	5.37	5.38	5.02	5.19	5.00	5.05	3.87	3.19	1678.0	4.6
35.0	3.28	3.99	4.67	5.08	5.19	5.18	4.85	5.07	4.96	5.11	3.96	3.27	1651.9	4.6
40.0	3.32	4.00	4.61	4.94	4.98	4.94	4.66	4.93	4.90	5.14	4.03	3.34	1636.7	4.5
45.0	3.34	3.98	4.53	4.77	4.75	4.69	4.45	4.76	4.82	5.13	4.07	3.38	1602.6	4.4
50.0	3.35	3.95	4.42	4.58	4.49	4.41	4.21	4.57	4.70	5.10	4.08	3.41	1559.8	4.3
60.0	3.30	3.81	4.14	4.12	3.92	3.79	3.68	4.11	4.40	4.94	4.04	3.40	1449.3	4.0
70.0	3.18	3.58	3.77	3.59	3.29	3.15	3.11	3.58	4.00	4.66	3.90	3.31	1311.7	3.6
80.0	2.99	3.28	3.32	3.00	2.65	2.48	2.52	2.98	3.52	4.28	3.67	3.14	1150.2	3.2
90.0	2.73	2.91	2.82	2.39	2.03	1.89	1.95	2.37	2.97	3.79	3.36	2.89	975.7	2.7

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LAKE CHARLES  
LA  
LATITUDE: 30 DEGREES 7 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.29	3.19	4.13	4.95	5.84	6.21	5.63	5.23	4.67	4.36	2.89	2.22	1571.2	4.3
10.0	2.56	3.45	4.33	5.02	5.78	6.10	5.58	5.30	4.91	4.81	3.28	2.53	1633.8	4.5
15.0	2.67	3.56	4.39	5.01	5.71	5.99	5.51	5.29	4.99	5.00	3.45	2.67	1651.7	4.5
20.0	2.77	3.64	4.43	4.98	5.61	5.85	5.41	5.26	5.04	5.16	3.60	2.80	1660.6	4.5
25.0	2.85	3.71	4.45	4.92	5.47	5.68	5.28	5.20	5.06	5.29	3.73	2.90	1660.2	4.5
30.0	2.91	3.75	4.44	4.83	5.31	5.48	5.12	5.11	5.06	5.38	3.83	3.00	1650.8	4.5
35.0	2.96	3.78	4.41	4.72	5.13	5.27	4.95	4.99	5.02	5.45	3.92	3.07	1633.5	4.5
40.0	3.00	3.78	4.35	4.59	4.92	5.03	4.75	4.85	4.96	5.48	3.98	3.13	1607.3	4.4
45.0	3.01	3.76	4.27	4.43	4.69	4.76	4.53	4.68	4.87	5.47	4.02	3.16	1572.4	4.3
50.0	3.01	3.72	4.17	4.26	4.43	4.47	4.29	4.49	4.75	5.44	4.03	3.18	1528.9	4.2
60.0	2.96	3.58	3.90	3.84	3.86	3.83	3.74	4.04	4.44	5.27	3.99	3.17	1417.9	3.9
70.0	2.85	3.37	3.55	3.34	3.25	3.17	3.15	3.51	4.03	4.97	3.84	3.07	1280.9	3.5
80.0	2.67	3.08	3.13	2.80	2.61	2.49	2.54	2.93	3.54	4.55	3.61	2.91	1120.9	3.1
90.0	2.43	2.73	2.65	2.24	2.00	1.89	1.96	2.33	2.98	4.03	3.30	2.68	949.0	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: NEW ORLEANS  
LA  
LATITUDE: 29 DEGREES 59 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.63	3.51	4.45	5.62	6.21	6.32	5.72	5.42	4.77	4.21	3.06	2.45	1655.1	4.5
10.0	2.96	3.82	4.67	5.70	6.15	6.20	5.67	5.50	5.02	4.65	3.49	2.83	1724.3	4.7
15.0	3.10	3.94	4.75	5.70	6.07	6.10	5.60	5.49	5.10	4.82	3.67	2.99	1744.6	4.8
20.0	3.23	4.04	4.79	5.66	5.96	5.95	5.49	5.45	5.15	4.97	3.84	3.14	1755.2	4.8
25.0	3.33	4.12	4.81	5.59	5.81	5.78	5.36	5.39	5.17	5.09	3.98	3.27	1755.9	4.8
30.0	3.42	4.18	4.80	5.49	5.63	5.57	5.20	5.29	5.17	5.18	4.10	3.37	1746.8	4.8
35.0	3.49	4.21	4.77	5.37	5.44	5.35	5.02	5.17	5.13	5.23	4.19	3.46	1729.4	4.7
40.0	3.54	4.22	4.71	5.21	5.21	5.10	4.82	5.02	5.07	5.26	4.26	3.53	1702.4	4.7
45.0	3.56	4.20	4.63	5.03	4.96	4.83	4.59	4.85	4.98	5.25	4.30	3.58	1665.9	4.6
50.0	3.57	4.16	4.51	4.82	4.68	4.53	4.34	4.65	4.86	5.21	4.32	3.61	1620.3	4.4
60.0	3.52	4.01	4.22	4.33	4.06	3.87	3.78	4.18	4.54	5.05	4.27	3.59	1503.0	4.1
70.0	3.39	3.77	3.84	3.76	3.39	3.21	3.18	3.63	4.12	4.76	4.12	3.50	1357.7	3.7
80.0	3.18	3.45	3.38	3.11	2.70	2.51	2.56	3.01	3.61	4.36	3.88	3.31	1187.3	3.3
90.0	2.90	3.06	2.35	2.46	2.04	1.89	1.96	2.38	3.04	3.86	3.54	3.05	1004.0	2.8



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SHREVEPORT  
LA  
LATITUDE: 32 DEGREES 28 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.40	3.28	4.22	5.09	5.95	6.51	6.34	5.92	4.89	4.11	2.92	2.30	1642.9	4.5
10.0	2.73	3.59	4.45	5.18	5.92	6.42	6.31	6.05	5.19	4.58	3.38	2.69	1720.7	4.7
15.0	2.87	3.72	4.53	5.19	5.86	6.32	6.25	6.06	5.29	4.77	3.58	2.87	1745.2	4.8
20.0	3.00	3.82	4.59	5.17	5.76	6.19	6.14	6.04	5.37	4.94	3.76	3.02	1759.9	4.8
25.0	3.11	3.91	4.62	5.11	5.64	6.02	6.00	5.98	5.41	5.08	3.92	3.16	1764.7	4.8
30.0	3.20	3.97	4.62	5.04	5.48	5.82	5.83	5.89	5.42	5.18	4.06	3.28	1759.5	4.8
35.0	3.27	4.01	4.60	4.93	5.30	5.60	5.64	5.77	5.40	5.26	4.16	3.38	1745.2	4.8
40.0	3.32	4.03	4.56	4.80	5.10	5.36	5.42	5.62	5.35	5.30	4.25	3.47	1721.8	4.7
45.0	3.36	4.02	4.48	4.65	4.87	5.08	5.17	5.43	5.27	5.31	4.31	3.52	1688.8	4.6
50.0	3.37	4.00	4.39	4.47	4.62	4.79	4.90	5.22	5.16	5.29	4.34	3.56	1646.4	4.5
60.0	3.34	3.87	4.12	4.05	4.05	4.12	4.27	4.71	4.85	5.15	4.32	3.57	1534.7	4.2
70.0	3.24	3.66	3.77	3.56	3.42	3.43	3.59	4.11	4.43	4.88	4.20	3.50	1392.4	3.8
80.0	3.05	3.37	3.34	2.99	2.78	2.71	2.89	3.42	3.91	4.50	3.97	3.33	1224.8	3.4
90.0	2.80	3.00	2.85	2.41	2.14	2.04	2.19	2.71	3.32	4.02	3.65	3.09	1040.6	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BOSTON  
MA  
LATITUDE: 42 DEGREES 22 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.50	2.24	3.20	4.18	5.11	5.72	5.52	4.69	3.97	2.80	1.59	1.27	1273.4	3.5
10.0	1.78	2.51	3.44	4.33	5.17	5.74	5.59	4.87	4.31	3.21	1.90	1.56	1353.0	3.7
15.0	1.90	2.63	3.54	4.37	5.16	5.71	5.58	4.92	4.44	3.39	2.04	1.69	1382.1	3.8
20.0	2.02	2.73	3.61	4.38	5.12	5.64	5.54	4.95	4.56	3.55	2.17	1.81	1403.7	3.8
25.0	2.12	2.82	3.67	4.38	5.06	5.55	5.47	4.94	4.64	3.69	2.29	1.92	1417.6	3.9
30.0	2.22	2.89	3.70	4.35	4.97	5.43	5.37	4.91	4.70	3.80	2.39	2.02	1423.6	3.9
35.0	2.29	2.95	3.72	4.29	4.85	5.27	5.24	4.86	4.73	3.90	2.48	2.11	1421.8	3.9
40.0	2.36	2.99	3.71	4.22	4.71	5.09	5.09	4.77	4.73	3.97	2.56	2.18	1412.1	3.9
45.0	2.41	3.01	3.69	4.12	4.55	4.90	4.91	4.67	4.70	4.01	2.62	2.24	1395.5	3.8
50.0	2.45	3.02	3.64	4.01	4.37	4.69	4.72	4.54	4.65	4.03	2.66	2.29	1372.0	3.8
60.0	2.48	2.98	3.49	3.72	3.96	4.19	4.26	4.21	4.47	4.00	2.70	2.34	1302.8	3.6
70.0	2.44	2.87	3.27	3.36	3.47	3.63	3.73	3.79	4.18	3.88	2.67	2.34	1205.9	3.3
80.0	2.36	2.69	2.97	2.93	2.94	3.04	3.14	3.30	3.81	3.66	2.58	2.27	1036.1	3.0
90.0	2.21	2.46	2.62	2.46	2.40	2.42	2.54	2.76	3.35	3.35	2.42	2.15	947.8	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BALTIMORE MD  
LATITUDE: 39 DEGREES 11 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.85	2.65	3.65	4.69	5.40	5.93	5.74	5.05	4.19	3.14	2.08	1.58	1399.7	3.8
10.0	2.17	2.96	3.91	4.84	5.44	5.92	5.78	5.22	4.51	3.56	2.48	1.90	1482.7	4.1
15.0	2.32	3.09	4.01	4.87	5.41	5.86	5.76	5.26	4.63	3.74	2.66	2.05	1512.1	4.1
20.0	2.45	3.20	4.09	4.88	5.36	5.78	5.70	5.27	4.73	3.89	2.82	2.18	1533.2	4.2
25.0	2.57	3.30	4.14	4.86	5.28	5.67	5.61	5.25	4.80	4.03	2.97	2.31	1545.8	4.2
30.0	2.67	3.38	4.17	4.82	5.17	5.52	5.49	5.20	4.84	4.14	3.10	2.42	1549.8	4.2
35.0	2.76	3.44	4.18	4.74	5.03	5.35	5.35	5.13	4.85	4.23	3.21	2.51	1545.1	4.2
40.0	2.83	3.47	4.16	4.65	4.87	5.15	5.17	5.02	4.84	4.29	3.30	2.59	1532.1	4.2
45.0	2.88	3.49	4.12	4.53	4.69	4.94	4.98	4.90	4.80	4.32	3.37	2.65	1511.9	4.1
50.0	2.92	3.49	4.06	4.39	4.49	4.71	4.77	4.75	4.73	4.33	3.42	2.70	1463.4	4.1
60.0	2.93	3.43	3.87	4.05	4.03	4.17	4.27	4.37	4.51	4.27	3.45	2.75	1402.3	3.8
70.0	2.88	3.28	3.60	3.62	3.49	3.56	3.69	3.90	4.19	4.11	3.40	2.72	1291.1	3.5
80.0	2.76	3.07	3.25	3.13	2.93	2.95	3.08	3.36	3.78	3.84	3.26	2.63	1156.8	3.2
90.0	2.57	2.78	2.84	2.58	2.34	2.32	2.44	2.76	3.29	3.49	3.05	2.48	1001.8	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PATUXENT RIVER MD  
LATITUDE: 38 DEGREES 17 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.92	2.72	3.72	4.85	5.56	5.97	5.72	5.14	4.27	3.22	2.23	1.70	1431.6	3.9
10.0	2.24	3.03	3.97	4.99	5.59	5.95	5.76	5.30	4.59	3.63	2.65	2.04	1514.5	4.1
15.0	2.38	3.16	4.07	5.03	5.56	5.89	5.72	5.33	4.71	3.81	2.83	2.20	1543.6	4.2
20.0	2.51	3.27	4.14	5.03	5.50	5.80	5.66	5.34	4.80	3.96	3.00	2.34	1564.1	4.3
25.0	2.63	3.37	4.19	5.01	5.41	5.69	5.57	5.32	4.87	4.09	3.16	2.47	1576.0	4.3
30.0	2.73	3.44	4.22	4.96	5.30	5.54	5.45	5.27	4.91	4.20	3.27	2.59	1579.0	4.3
35.0	2.81	3.50	4.22	4.88	5.15	5.36	5.30	5.19	4.92	4.28	3.41	2.69	1573.3	4.3
40.0	2.88	3.53	4.20	4.78	4.98	5.16	5.12	5.08	4.90	4.34	3.50	2.77	1559.3	4.3
45.0	2.93	3.55	4.16	4.65	4.80	4.94	4.93	4.95	4.85	4.37	3.57	2.84	1537.7	4.2
50.0	2.97	3.54	4.09	4.51	4.59	4.70	4.71	4.79	4.78	4.37	3.62	2.88	1507.6	4.1
60.0	2.98	3.47	3.89	4.14	4.10	4.15	4.21	4.40	4.55	4.30	3.65	2.93	1422.9	3.9
70.0	2.92	3.32	3.61	3.69	3.54	3.53	3.62	3.92	4.22	4.13	3.59	2.90	1307.9	3.6
80.0	2.79	3.09	3.25	3.18	2.96	2.91	3.02	3.36	3.79	3.86	3.44	2.80	1169.6	3.2
90.0	2.60	2.80	2.83	2.61	2.35	2.28	2.38	2.75	3.29	3.50	3.21	2.63	1010.6	2.8

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BANGOR ME  
LATITUDE: 44 DEGREES 48 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.44	2.29	3.44	4.54	5.45	5.85	5.86	5.08	3.95	2.64	1.49	1.19	1317.7	3.6
10.0	1.75	2.62	3.75	4.74	5.54	5.89	5.97	5.32	4.34	3.07	1.83	1.51	1411.7	3.9
15.0	1.89	2.76	3.88	4.80	5.55	5.87	5.97	5.40	4.49	3.26	1.98	1.66	1447.3	4.0
20.0	2.03	2.89	3.98	4.83	5.52	5.81	5.94	5.44	4.62	3.43	2.12	1.79	1475.1	4.0
25.0	2.15	3.00	4.06	4.84	5.46	5.73	5.88	5.46	4.73	3.58	2.25	1.92	1494.5	4.1
30.0	2.26	3.10	4.12	4.82	5.38	5.61	5.79	5.44	4.80	3.71	2.37	2.03	1505.5	4.1
35.0	2.35	3.17	4.15	4.78	5.26	5.47	5.67	5.40	4.85	3.81	2.47	2.14	1508.0	4.1
40.0	2.43	3.23	4.16	4.71	5.12	5.30	5.51	5.32	4.87	3.89	2.56	2.23	1502.0	4.1
45.0	2.50	3.27	4.15	4.61	4.95	5.10	5.32	5.21	4.86	3.95	2.63	2.30	1487.5	4.1
50.0	2.55	3.29	4.11	4.49	4.77	4.89	5.13	5.08	4.82	3.99	2.69	2.36	1466.4	4.0
60.0	2.60	3.27	3.97	4.19	4.34	4.40	4.66	4.74	4.66	3.98	2.75	2.44	1399.9	3.8
70.0	2.59	3.17	3.74	3.80	3.82	3.83	4.09	4.29	4.39	3.88	2.74	2.45	1302.5	3.6
80.0	2.51	3.00	3.43	3.34	3.24	3.22	3.45	3.76	4.02	3.68	2.66	2.40	1178.1	3.2
90.0	2.37	2.77	3.04	2.82	2.66	2.60	2.81	3.15	3.56	3.40	2.52	2.29	1033.8	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CARIBOU ME  
LATITUDE: 46 DEGREES 52 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.32	2.28	3.57	4.46	4.98	5.54	5.56	4.73	3.47	2.17	1.16	0.98	1225.1	3.4
10.0	1.65	2.65	3.93	4.67	5.07	5.59	5.67	4.97	3.81	2.52	1.41	1.25	1315.9	3.6
15.0	1.80	2.81	4.08	4.74	5.08	5.58	5.68	5.05	3.95	2.67	1.53	1.38	1350.8	3.7
20.0	1.94	2.96	4.21	4.78	5.07	5.53	5.67	5.10	4.07	2.81	1.63	1.50	1378.5	3.8
25.0	2.06	3.09	4.31	4.80	5.02	5.46	5.62	5.12	4.17	2.94	1.73	1.61	1398.6	3.8
30.0	2.18	3.21	4.39	4.79	4.95	5.37	5.54	5.11	4.24	3.04	1.82	1.71	1410.9	3.9
35.0	2.28	3.30	4.44	4.76	4.86	5.24	5.43	5.07	4.29	3.13	1.90	1.80	1415.2	3.9
40.0	2.37	3.37	4.46	4.69	4.73	5.08	5.29	5.01	4.31	3.20	1.97	1.88	1411.5	3.9
45.0	2.44	3.43	4.46	4.61	4.59	4.90	5.13	4.92	4.30	3.25	2.02	1.95	1400.0	3.8
50.0	2.50	3.46	4.44	4.50	4.43	4.71	4.95	4.80	4.28	3.29	2.06	2.00	1381.7	3.8
60.0	2.57	3.46	4.31	4.21	4.05	4.27	4.52	4.50	4.15	3.29	2.11	2.08	1323.5	3.6
70.0	2.57	3.38	4.08	3.84	3.60	3.74	4.00	4.10	3.92	3.21	2.10	2.09	1236.3	3.4
80.0	2.51	3.22	3.76	3.39	3.08	3.17	3.41	3.62	3.61	3.06	2.05	2.06	1123.1	3.1
90.0	2.38	2.98	3.35	2.88	2.56	2.59	2.81	3.07	3.22	2.83	1.94	1.97	990.8	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PORTLAND  
ME  
LATITUDE: 43 DEGREES 39 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.42	2.15	3.05	4.11	4.94	5.40	5.23	4.61	3.65	2.59	1.45	1.14	1211.0	3.3
10.0	1.70	2.42	3.29	4.27	5.01	5.42	5.30	4.80	3.97	2.98	1.75	1.41	1289.0	3.5
15.0	1.83	2.54	3.38	4.31	5.00	5.39	5.30	4.86	4.09	3.15	1.83	1.53	1317.9	3.6
20.0	1.95	2.65	3.46	4.33	4.97	5.34	5.26	4.88	4.20	3.30	2.00	1.64	1339.7	3.7
25.0	2.05	2.74	3.51	4.33	4.91	5.26	5.20	4.89	4.28	3.43	2.11	1.74	1354.2	3.7
30.0	2.15	2.81	3.55	4.30	4.83	5.15	5.12	4.86	4.33	3.55	2.21	1.84	1361.2	3.7
35.0	2.23	2.87	3.57	4.26	4.72	5.01	5.00	4.81	4.36	3.64	2.30	1.92	1360.8	3.7
40.0	2.30	2.91	3.57	4.19	4.59	4.85	4.86	4.73	4.37	3.71	2.37	1.99	1352.9	3.7
45.0	2.35	2.94	3.55	4.10	4.44	4.66	4.70	4.63	4.35	3.75	2.43	2.04	1338.0	3.7
50.0	2.39	2.95	3.51	3.99	4.27	4.47	4.52	4.51	4.31	3.78	2.47	2.09	1316.9	3.6
60.0	2.43	2.92	3.37	3.71	3.88	4.02	4.10	4.20	4.15	3.76	2.51	2.14	1253.5	3.4
70.0	2.41	2.82	3.16	3.36	3.42	3.50	3.60	3.79	3.89	3.65	2.49	2.14	1163.6	3.2
80.0	2.32	2.66	2.89	2.95	2.91	2.95	3.05	3.32	3.55	3.45	2.41	2.09	1051.0	2.9
90.0	2.19	2.44	2.55	2.49	2.39	2.38	2.50	2.78	3.14	3.17	2.27	1.98	921.0	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ALPENA MI  
LATITUDE: 45 DEGREES 4 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.15	1.94	3.24	4.44	5.43	5.92	5.94	5.00	3.64	2.34	1.21	0.85	1252.7	3.4
10.0	1.35	2.19	3.52	4.63	5.52	5.97	6.05	5.23	3.98	2.70	1.44	1.09	1331.1	3.6
15.0	1.44	2.30	3.63	4.69	5.52	5.94	6.05	5.31	4.12	2.86	1.54	1.20	1359.8	3.7
20.0	1.53	2.39	3.73	4.72	5.50	5.89	6.03	5.35	4.23	3.00	1.64	1.31	1381.1	3.8
25.0	1.60	2.48	3.80	4.73	5.44	5.80	5.97	5.37	4.32	3.12	1.73	1.41	1394.8	3.8
30.0	1.67	2.55	3.85	4.71	5.36	5.69	5.88	5.35	4.39	3.23	1.81	1.49	1400.7	3.8
35.0	1.73	2.60	3.88	4.67	5.25	5.54	5.75	5.30	4.43	3.31	1.87	1.57	1398.9	3.8
40.0	1.78	2.64	3.89	4.60	5.11	5.37	5.59	5.23	4.44	3.38	1.93	1.64	1389.2	3.8
45.0	1.82	2.66	3.88	4.50	4.94	5.17	5.41	5.12	4.43	3.42	1.98	1.70	1371.8	3.8
50.0	1.85	2.67	3.84	4.39	4.76	4.96	5.21	5.00	4.39	3.45	2.01	1.75	1348.6	3.7
60.0	1.87	2.65	3.71	4.10	4.33	4.46	4.73	4.66	4.24	3.44	2.04	1.81	1280.5	3.5
70.0	1.85	2.56	3.49	3.72	3.82	3.89	4.16	4.23	3.99	3.35	2.02	1.82	1184.7	3.2
80.0	1.79	2.42	3.20	3.27	3.24	3.27	3.51	3.71	3.66	3.17	1.96	1.79	1065.2	2.9
90.0	1.68	2.23	2.84	2.76	2.66	2.64	2.86	3.12	3.25	2.93	1.85	1.71	929.0	2.5



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DETROIT MI  
LATITUDE: 42 DEGREES 25 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.32	2.14	3.14	4.42	5.41	5.89	5.79	4.97	3.95	2.76	1.51	1.08	1291.6	3.5
10.0	1.53	2.40	3.38	4.58	5.48	5.91	5.87	5.17	4.29	3.17	1.79	1.29	1366.4	3.7
15.0	1.63	2.50	3.47	4.62	5.47	5.87	5.86	5.22	4.42	3.34	1.92	1.39	1393.0	3.8
20.0	1.72	2.60	3.54	4.64	5.43	5.81	5.82	5.25	4.53	3.50	2.04	1.47	1412.0	3.9
25.0	1.80	2.68	3.60	4.64	5.36	5.71	5.74	5.25	4.62	3.63	2.15	1.55	1423.2	3.9
30.0	1.87	2.74	3.63	4.61	5.27	5.58	5.64	5.22	4.67	3.74	2.24	1.62	1426.6	3.9
35.0	1.92	2.79	3.64	4.55	5.14	5.43	5.50	5.16	4.70	3.84	2.32	1.68	1422.1	3.9
40.0	1.97	2.83	3.64	4.47	4.99	5.24	5.34	5.07	4.71	3.91	2.39	1.73	1409.7	3.9
45.0	2.01	2.85	3.61	4.37	4.82	5.04	5.15	4.96	4.68	3.95	2.44	1.77	1390.5	3.8
50.0	2.03	2.85	3.57	4.25	4.64	4.82	4.95	4.82	4.63	3.97	2.48	1.80	1364.6	3.7
60.0	2.04	2.81	3.42	3.95	4.19	4.31	4.47	4.47	4.45	3.94	2.51	1.83	1290.7	3.5
70.0	2.01	2.70	3.20	3.56	3.67	3.72	3.90	4.03	4.16	3.82	2.48	1.82	1189.5	3.3
80.0	1.93	2.54	2.91	3.11	3.10	3.11	3.28	3.51	3.79	3.60	2.40	1.76	1066.0	2.9
90.0	1.81	2.32	2.57	2.60	2.52	2.48	2.64	2.92	3.33	3.30	2.25	1.67	925.0	2.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJH/SQ. M)  
 SITE: FLINT MI  
 LATITUDE: 42 DEGREES 58 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.21	2.01	3.01	4.22	5.22	5.71	5.67	4.91	3.77	2.61	1.36	0.97	1239.8	3.4
10.0	1.40	2.24	3.23	4.38	5.29	5.74	5.75	5.11	4.09	2.99	1.60	1.23	1311.7	3.6
15.0	1.48	2.34	3.32	4.42	5.29	5.70	5.74	5.17	4.22	3.16	1.71	1.34	1337.3	3.7
20.0	1.55	2.42	3.39	4.44	5.25	5.64	5.71	5.20	4.32	3.31	1.81	1.45	1355.7	3.7
25.0	1.62	2.49	3.44	4.44	5.19	5.55	5.64	5.20	4.40	3.43	1.90	1.55	1366.7	3.7
30.0	1.68	2.55	3.47	4.41	5.10	5.43	5.54	5.17	4.46	3.54	1.98	1.64	1370.2	3.8
35.0	1.73	2.60	3.48	4.36	4.98	5.28	5.41	5.12	4.49	3.63	2.05	1.72	1366.1	3.7
40.0	1.77	2.63	3.48	4.28	4.84	5.11	5.25	5.03	4.49	3.69	2.10	1.79	1354.5	3.7
45.0	1.80	2.65	3.45	4.19	4.68	4.91	5.07	4.92	4.47	3.74	2.15	1.85	1336.3	3.7
50.0	1.82	2.65	3.41	4.07	4.50	4.70	4.88	4.79	4.42	3.76	2.18	1.90	1311.7	3.6
60.0	1.83	2.51	3.27	3.78	4.08	4.21	4.41	4.45	4.25	3.73	2.20	1.95	1241.6	3.4
70.0	1.80	2.51	3.06	3.42	3.58	3.65	3.86	4.01	3.98	3.62	2.17	1.96	1145.4	3.1
80.0	1.72	2.36	2.79	2.99	3.03	3.06	3.25	3.50	3.63	3.41	2.09	1.91	1027.6	2.8
90.0	1.61	2.16	2.47	2.52	2.47	2.45	2.63	2.92	3.20	3.13	1.97	1.82	893.2	2.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: GRAND RAPIDS MI  
LATITUDE: 42 DEGREES 53 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.17	2.04	3.19	4.45	5.54	6.17	6.03	5.28	3.97	2.71	1.41	0.98	1309.0	3.6
10.0	1.42	2.28	3.44	4.62	5.62	6.20	6.12	5.51	4.33	3.10	1.67	1.23	1387.9	3.8
15.0	1.53	2.38	3.54	4.67	5.61	6.16	6.11	5.58	4.47	3.28	1.78	1.35	1416.1	3.9
20.0	1.64	2.47	3.61	4.69	5.57	6.10	6.08	5.62	4.58	3.43	1.89	1.46	1436.6	3.9
25.0	1.73	2.54	3.67	4.69	5.51	6.00	6.00	5.63	4.67	3.57	1.99	1.56	1449.1	4.0
30.0	1.82	2.60	3.71	4.66	5.41	5.86	5.90	5.60	4.73	3.68	2.07	1.65	1453.4	4.0
35.0	1.89	2.65	3.73	4.61	5.28	5.70	5.76	5.54	4.77	3.77	2.15	1.73	1449.6	4.0
40.0	1.95	2.68	3.72	4.53	5.13	5.51	5.59	5.45	4.77	3.84	2.21	1.80	1437.7	3.9
45.0	2.01	2.70	3.70	4.43	4.96	5.29	5.39	5.33	4.75	3.89	2.26	1.85	1418.6	3.9
50.0	2.04	2.70	3.66	4.31	4.77	5.06	5.18	5.19	4.70	3.91	2.29	1.90	1392.6	3.8
60.0	2.08	2.66	3.51	4.00	4.31	4.53	4.68	4.81	4.52	3.89	2.32	1.96	1318.0	3.6
70.0	2.07	2.56	3.29	3.61	3.78	3.90	4.08	4.34	4.24	3.77	2.29	1.96	1215.0	3.3
80.0	2.00	2.41	3.00	3.16	3.19	3.26	3.42	3.77	3.86	3.56	2.21	1.92	1088.6	3.0
90.0	1.88	2.20	2.65	2.65	2.59	2.58	2.76	3.14	3.40	3.26	2.08	1.82	944.1	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: HOUGHTON  
LATITUDE: 47 DEGREES 10 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	0.77	1.53	2.94	4.30	5.23	5.79	5.80	4.80	3.18	2.11	0.92	0.60	1158.3	3.2
10.0	0.94	1.70	3.20	4.51	5.34	5.85	5.92	5.04	3.49	2.45	1.16	0.76	1231.0	3.4
15.0	1.01	1.77	3.31	4.57	5.35	5.83	5.94	5.12	3.61	2.61	1.27	0.84	1257.6	3.4
20.0	1.09	1.84	3.40	4.62	5.33	5.79	5.93	5.18	3.71	2.74	1.37	0.90	1277.7	3.5
25.0	1.15	1.89	3.47	4.63	5.29	5.71	5.88	5.20	3.80	2.86	1.46	0.97	1290.7	3.5
30.0	1.21	1.94	3.53	4.62	5.22	5.61	5.80	5.20	3.86	2.97	1.55	1.02	1296.7	3.6
35.0	1.26	1.98	3.56	4.59	5.12	5.48	5.69	5.16	3.90	3.05	1.62	1.08	1295.4	3.5
40.0	1.30	2.00	3.57	4.53	4.99	5.32	5.54	5.10	3.91	3.12	1.69	1.12	1286.9	3.5
45.0	1.34	2.02	3.57	4.45	4.84	5.13	5.37	5.01	3.91	3.17	1.74	1.16	1271.4	3.5
50.0	1.36	2.02	3.54	4.34	4.67	4.93	5.18	4.89	3.82	3.20	1.79	1.19	1249.9	3.4
60.0	1.39	1.99	3.43	4.07	4.27	4.47	4.73	4.58	3.76	3.21	1.84	1.23	1188.3	3.3
70.0	1.39	1.93	3.24	3.71	3.79	3.92	4.19	4.18	3.56	3.13	1.85	1.24	1101.2	3.0
80.0	1.35	1.82	2.99	3.29	3.25	3.31	3.57	3.69	3.27	2.99	1.80	1.22	991.8	2.7
90.0	1.28	1.68	2.67	2.80	2.69	2.71	2.93	3.13	2.92	2.77	1.72	1.16	866.9	2.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SAULI STE. MARIE MI  
LATITUDE: 46 DEGREES 28 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.03	1.90	3.24	4.36	5.32	5.71	5.79	4.80	3.30	2.12	1.05	0.80	1201.5	3.3
10.0	1.21	2.17	3.54	4.56	5.42	5.76	5.90	5.03	3.61	2.45	1.25	1.05	1278.9	3.5
15.0	1.29	2.28	3.67	4.62	5.43	5.74	5.92	5.11	3.74	2.59	1.34	1.16	1307.5	3.6
20.0	1.37	2.38	3.77	4.66	5.41	5.69	5.90	5.16	3.85	2.73	1.42	1.27	1329.2	3.6
25.0	1.44	2.47	3.86	4.68	5.37	5.62	5.85	5.18	3.93	2.84	1.49	1.37	1343.7	3.7
30.0	1.50	2.55	3.92	4.66	5.29	5.52	5.76	5.17	3.99	2.94	1.56	1.46	1350.6	3.7
35.0	1.56	2.61	3.96	4.63	5.18	5.38	5.65	5.13	4.03	3.02	1.62	1.54	1350.1	3.7
40.0	1.60	2.66	3.97	4.56	5.05	5.22	5.50	5.06	4.05	3.08	1.67	1.62	1342.0	3.7
45.0	1.64	2.69	3.97	4.48	4.89	5.03	5.33	4.97	4.04	3.13	1.71	1.68	1326.5	3.6
50.0	1.66	2.70	3.94	4.37	4.72	4.83	5.14	4.85	4.01	3.16	1.74	1.73	1305.1	3.6
60.0	1.69	2.69	3.81	4.09	4.31	4.37	4.68	4.54	3.88	3.15	1.76	1.80	1242.0	3.4
70.0	1.67	2.61	3.60	3.73	3.82	3.83	4.14	4.13	3.67	3.07	1.75	1.82	1152.2	3.2
80.0	1.62	2.47	3.31	3.29	3.26	3.24	3.51	3.64	3.37	2.92	1.70	1.79	1038.9	2.8
90.0	1.53	2.28	2.95	2.79	2.69	2.64	2.88	3.08	3.00	2.70	1.60	1.72	909.3	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: TRAVERSE CITY MI  
LATITUDE: 44 DEGREES 44 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.98	1.79	3.15	4.43	5.45	6.03	6.02	5.08	3.67	2.38	1.19	0.81	1249.4	3.4
10.0	1.19	1.99	3.42	4.62	5.54	6.07	6.13	5.32	4.01	2.74	1.41	1.02	1324.9	3.6
15.0	1.29	2.08	3.52	4.67	5.55	6.04	6.14	5.39	4.14	2.89	1.51	1.12	1352.1	3.7
20.0	1.38	2.16	3.61	4.70	5.52	5.99	6.11	5.43	4.26	3.03	1.60	1.21	1372.0	3.8
25.0	1.46	2.22	3.68	4.71	5.46	5.90	6.04	5.45	4.34	3.16	1.68	1.30	1384.3	3.8
30.0	1.54	2.27	3.72	4.69	5.38	5.78	5.95	5.43	4.41	3.26	1.75	1.37	1388.8	3.8
35.0	1.60	2.32	3.75	4.65	5.26	5.63	5.82	5.38	4.45	3.35	1.81	1.44	1385.7	3.8
40.0	1.66	2.34	3.75	4.58	5.12	5.45	5.66	5.31	4.46	3.41	1.86	1.50	1374.8	3.8
45.0	1.70	2.36	3.74	4.48	4.95	5.24	5.47	5.20	4.45	3.46	1.91	1.55	1356.4	3.7
50.0	1.73	2.36	3.70	4.37	4.77	5.03	5.26	5.07	4.41	3.48	1.94	1.59	1332.3	3.7
60.0	1.77	2.33	3.57	4.07	4.34	4.52	4.78	4.72	4.25	3.47	1.96	1.64	1262.4	3.5
70.0	1.76	2.25	3.36	3.69	3.82	3.93	4.19	4.28	4.00	3.37	1.94	1.65	1165.5	3.2
80.0	1.71	2.12	3.07	3.25	3.24	3.30	3.53	3.75	3.66	3.20	1.88	1.62	1045.4	2.9
90.0	1.61	1.94	2.73	2.74	2.66	2.65	2.87	3.14	3.25	2.95	1.77	1.54	909.1	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DULUTH  
 MN  
 LATITUDE: 46 DEGREES 50 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.23	2.12	3.25	4.33	5.18	5.57	5.85	4.88	3.45	2.29	1.20	0.92	1227.1	3.4
10.0	1.51	2.45	3.57	4.53	5.28	5.62	5.97	5.13	3.79	2.67	1.48	1.16	1314.9	3.6
15.0	1.63	2.60	3.70	4.59	5.29	5.60	5.99	5.21	3.93	2.84	1.60	1.28	1348.3	3.7
20.0	1.75	2.73	3.80	4.63	5.27	5.56	5.97	5.26	4.05	2.99	1.72	1.38	1374.5	3.8
25.0	1.86	2.84	3.89	4.65	5.23	5.49	5.92	5.29	4.14	3.13	1.83	1.48	1393.2	3.8
30.0	1.96	2.94	3.95	4.64	5.16	5.39	5.84	5.28	4.21	3.24	1.92	1.57	1404.0	3.8
35.0	2.05	3.02	3.99	4.60	5.06	5.26	5.72	5.24	4.26	3.34	2.01	1.65	1406.9	3.9
40.0	2.12	3.08	4.01	4.54	4.93	5.10	5.58	5.18	4.28	3.42	2.08	1.71	1402.0	3.8
45.0	2.18	3.13	4.01	4.46	4.78	4.92	5.40	5.08	4.27	3.48	2.14	1.77	1389.2	3.8
50.0	2.23	3.15	3.98	4.35	4.61	4.73	5.21	4.96	4.25	3.51	2.19	1.82	1369.8	3.8
60.0	2.28	3.15	3.86	4.08	4.22	4.28	4.75	4.65	4.12	3.52	2.24	1.88	1309.7	3.6
70.0	2.28	3.07	3.65	3.72	3.74	3.76	4.20	4.24	3.89	3.44	2.24	1.90	1221.0	3.3
80.0	2.22	2.92	3.36	3.28	3.20	3.18	3.57	3.74	3.58	3.28	2.18	1.86	1106.7	3.0
90.0	2.11	2.70	3.00	2.79	2.65	2.60	2.93	3.16	3.19	3.04	2.07	1.78	974.0	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: INTERNATIONAL FALLMUN  
 LATITUDE: 48 DEGREES 34 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.12	2.09	3.29	4.55	5.41	5.84	6.05	5.10	3.53	2.22	1.09	0.85	1254.2	3.4
10.0	1.40	2.44	3.64	4.79	5.53	5.91	6.21	5.39	3.92	2.62	1.36	1.12	1351.4	3.7
15.0	1.53	2.60	3.78	4.88	5.55	5.90	6.23	5.50	4.08	2.81	1.48	1.24	1389.0	3.8
20.0	1.65	2.75	3.91	4.93	5.55	5.86	6.23	5.57	4.21	2.97	1.60	1.36	1419.2	3.9
25.0	1.77	2.87	4.01	4.96	5.51	5.80	6.19	5.61	4.32	3.12	1.71	1.47	1441.5	3.9
30.0	1.87	2.99	4.09	4.96	5.44	5.70	6.11	5.61	4.41	3.25	1.80	1.57	1455.7	4.0
35.0	1.96	3.08	4.14	4.93	5.34	5.57	6.00	5.59	4.47	3.36	1.89	1.66	1461.6	4.0
40.0	2.03	3.15	4.17	4.88	5.22	5.42	5.86	5.53	4.51	3.45	1.96	1.73	1459.1	4.0
45.0	2.10	3.21	4.18	4.79	5.07	5.23	5.69	5.44	4.52	3.51	2.02	1.80	1448.2	4.0
50.0	2.15	3.25	4.16	4.69	4.89	5.03	5.48	5.32	4.50	3.56	2.07	1.86	1429.7	3.9
60.0	2.21	3.26	4.05	4.41	4.49	4.57	5.02	5.01	4.38	3.58	2.13	1.94	1371.6	3.8
70.0	2.22	3.20	3.85	4.04	4.00	4.03	4.46	4.58	4.16	3.52	2.14	1.96	1282.8	3.5
80.0	2.17	3.05	3.56	3.58	3.43	3.41	3.81	4.06	3.85	3.37	2.09	1.94	1166.3	3.2
90.0	2.07	2.84	3.19	3.06	2.85	2.80	3.13	3.45	3.45	3.14	1.99	1.87	1029.3	2.8



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MINNEAPOLIS-ST. PAUL  
LATITUDE: 44 DEGREES 53 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.47	2.41	3.47	4.55	5.47	6.08	6.21	5.32	3.95	2.71	1.52	1.11	1349.1	3.7
10.0	1.80	2.77	3.79	4.75	5.57	6.12	6.33	5.59	4.34	3.15	1.87	1.40	1445.9	4.0
15.0	1.95	2.92	3.92	4.81	5.57	6.09	6.33	5.67	4.50	3.35	2.03	1.53	1482.6	4.1
20.0	2.08	3.07	4.02	4.84	5.54	6.04	6.31	5.72	4.63	3.53	2.18	1.65	1511.2	4.1
25.0	2.21	3.19	4.11	4.85	5.49	5.95	6.24	5.74	4.74	3.69	2.32	1.76	1531.2	4.2
30.0	2.33	3.30	4.17	4.83	5.40	5.83	6.15	5.72	4.81	3.82	2.44	1.86	1542.5	4.2
35.0	2.42	3.38	4.20	4.79	5.29	5.68	6.01	5.68	4.86	3.93	2.55	1.95	1545.0	4.2
40.0	2.51	3.45	4.21	4.72	5.14	5.50	5.85	5.60	4.88	4.02	2.64	2.03	1538.7	4.2
45.0	2.58	3.49	4.20	4.62	4.97	5.29	5.65	5.49	4.87	4.08	2.71	2.09	1523.7	4.2
50.0	2.63	3.52	4.17	4.50	4.79	5.07	5.44	5.35	4.83	4.12	2.77	2.15	1501.9	4.1
60.0	2.69	3.50	4.02	4.20	4.36	4.56	4.93	4.99	4.67	4.12	2.84	2.21	1433.2	3.9
70.0	2.68	3.40	3.79	3.81	3.84	3.97	4.33	4.52	4.40	4.01	2.83	2.22	1332.7	3.7
80.0	2.60	3.22	3.47	3.35	3.26	3.33	3.64	3.95	4.03	3.81	2.75	2.17	1204.4	3.3
90.0	2.46	2.97	3.08	2.82	2.67	2.68	2.95	3.31	3.57	3.52	2.60	2.07	1055.6	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ROCHESTER  
LATITUDE: 43 DEGREES 55 MINUTES  
MN

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.51	2.37	3.41	4.45	5.35	5.99	6.02	5.25	3.94	2.74	1.56	1.17	1333.4	3.7
10.0	1.83	2.71	3.70	4.63	5.43	6.03	6.12	5.49	4.31	3.17	1.90	1.45	1424.6	3.9
15.0	1.97	2.85	3.82	4.68	5.43	6.00	6.12	5.56	4.45	3.36	2.06	1.58	1458.7	4.0
20.0	2.11	2.98	3.91	4.71	5.40	5.94	6.09	5.60	4.58	3.53	2.21	1.70	1484.8	4.1
25.0	2.23	3.09	3.99	4.71	5.34	5.85	6.02	5.61	4.67	3.68	2.34	1.81	1502.5	4.1
30.0	2.34	3.19	4.04	4.69	5.25	5.73	5.92	5.59	4.74	3.81	2.45	1.91	1511.8	4.1
35.0	2.43	3.26	4.06	4.64	5.13	5.57	5.79	5.54	4.78	3.91	2.56	2.00	1512.5	4.1
40.0	2.51	3.32	4.07	4.56	4.99	5.39	5.62	5.46	4.79	3.99	2.64	2.07	1504.7	4.1
45.0	2.58	3.36	4.05	4.47	4.82	5.18	5.43	5.34	4.78	4.05	2.71	2.13	1488.8	4.1
50.0	2.62	3.37	4.01	4.35	4.64	4.97	5.22	5.21	4.73	4.08	2.77	2.18	1466.1	4.0
60.0	2.67	3.35	3.86	4.05	4.22	4.46	4.73	4.84	4.57	4.06	2.82	2.24	1396.2	3.8
70.0	2.66	3.25	3.63	3.67	3.71	3.87	4.14	4.38	4.29	3.95	2.81	2.25	1295.7	3.5
80.0	2.57	3.07	3.32	3.21	3.14	3.24	3.48	3.82	3.92	3.74	2.72	2.19	1169.0	3.2
90.0	2.43	2.82	2.94	2.70	2.57	2.59	2.82	3.19	3.46	3.44	2.57	2.08	1022.4	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: COLUMBIA MO  
LATITUDE: 38 DEGREES 49 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.93	2.76	3.71	4.81	5.93	6.59	6.67	5.93	4.57	3.47	2.22	1.65	1530.8	4.2
10.0	2.27	3.08	3.98	4.96	5.97	6.58	6.72	6.14	4.93	3.96	2.65	1.99	1621.9	4.4
15.0	2.42	3.22	4.07	5.00	5.95	6.52	6.69	6.20	5.07	4.17	2.84	2.15	1653.9	4.5
20.0	2.55	3.34	4.15	5.00	5.89	6.42	6.62	6.22	5.18	4.36	3.02	2.29	1676.6	4.6
25.0	2.68	3.44	4.20	4.98	5.79	6.29	6.52	6.20	5.27	4.51	3.17	2.42	1689.7	4.6
30.0	2.78	3.52	4.23	4.94	5.67	6.12	6.37	6.15	5.32	4.65	3.31	2.53	1693.2	4.6
35.0	2.87	3.58	4.24	4.86	5.51	5.92	6.19	6.06	5.34	4.75	3.43	2.63	1687.0	4.6
40.0	2.95	3.62	4.22	4.76	5.33	5.69	5.98	5.94	5.32	4.82	3.53	2.72	1671.6	4.6
45.0	3.00	3.64	4.18	4.64	5.13	5.45	5.75	5.79	5.28	4.87	3.61	2.78	1648.2	4.5
50.0	3.04	3.64	4.12	4.50	4.91	5.18	5.49	5.61	5.20	4.88	3.66	2.83	1615.5	4.4
60.0	3.06	3.57	3.92	4.14	4.39	4.57	4.89	5.15	4.96	4.82	3.70	2.88	1523.1	4.2
70.0	3.00	3.42	3.64	3.70	3.78	3.86	4.18	4.58	4.61	4.64	3.64	2.86	1397.3	3.8
80.0	2.88	3.19	3.29	3.19	3.15	3.16	3.45	3.91	4.15	4.35	3.50	2.76	1246.3	3.4
90.0	2.68	2.90	2.86	2.62	2.49	2.44	2.68	3.17	3.60	3.95	3.26	2.60	1072.5	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: KANSAS CITY MO  
LATITUDE: 39 DEGREES 18 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.05	2.82	3.79	4.97	5.90	6.56	6.62	5.87	4.58	3.44	2.32	1.78	1544.8	4.2
10.0	2.43	3.17	4.06	5.13	5.95	6.55	6.68	6.09	4.95	3.94	2.80	2.18	1643.3	4.5
15.0	2.60	3.31	4.17	5.17	5.93	6.49	6.65	6.15	5.10	4.15	3.02	2.36	1678.8	4.6
20.0	2.76	3.44	4.25	5.18	5.87	6.40	6.59	6.17	5.22	4.34	3.22	2.53	1704.7	4.7
25.0	2.90	3.55	4.31	5.17	5.78	6.27	6.49	6.16	5.30	4.50	3.40	2.68	1720.9	4.7
30.0	3.03	3.64	4.34	5.12	5.66	6.11	6.35	6.11	5.36	4.64	3.55	2.82	1727.2	4.7
35.0	3.13	3.70	4.35	5.05	5.51	5.91	6.17	6.02	5.38	4.74	3.69	2.94	1723.6	4.7
40.0	3.22	3.75	4.34	4.95	5.33	5.69	5.96	5.91	5.37	4.82	3.80	3.04	1710.3	4.7
45.0	3.29	3.77	4.30	4.82	5.13	5.45	5.74	5.76	5.33	4.87	3.89	3.12	1689.0	4.6
50.0	3.34	3.78	4.24	4.67	4.91	5.18	5.48	5.58	5.26	4.89	3.95	3.18	1658.0	4.5
60.0	3.37	3.71	4.04	4.30	4.40	4.57	4.89	5.13	5.02	4.83	4.01	3.25	1568.1	4.3
70.0	3.32	3.56	3.76	3.85	3.80	3.88	4.19	4.57	4.67	4.65	3.96	3.23	1443.4	4.0
80.0	3.18	3.33	3.40	3.32	3.16	3.18	3.46	3.91	4.21	4.37	3.81	3.13	1291.9	3.5
90.0	2.97	3.03	2.96	2.73	2.51	2.46	2.70	3.18	3.66	3.97	3.56	2.96	1116.1	3.1

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SPRINGFIELD MO  
LATITUDE: 37 DEGREES 14 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.15	2.92	3.89	5.06	5.94	6.54	6.51	5.91	4.66	3.60	2.44	1.90	1569.9	4.3
10.0	2.52	3.25	4.15	5.20	5.96	6.51	6.54	6.10	5.01	4.08	2.90	2.29	1660.7	4.5
15.0	2.69	3.39	4.24	5.23	5.92	6.44	6.50	6.14	5.14	4.29	3.10	2.47	1692.2	4.6
20.0	2.83	3.51	4.32	5.23	5.86	6.34	6.42	6.15	5.25	4.46	3.28	2.63	1714.1	4.7
25.0	2.97	3.61	4.37	5.21	5.75	6.20	6.31	6.12	5.32	4.62	3.45	2.78	1726.3	4.7
30.0	3.08	3.68	4.39	5.15	5.62	6.02	6.16	6.06	5.36	4.74	3.59	2.91	1728.6	4.7
35.0	3.18	3.74	4.39	5.07	5.46	5.82	5.97	5.97	5.37	4.84	3.71	3.02	1721.0	4.7
40.0	3.25	3.78	4.37	4.96	5.28	5.59	5.77	5.84	5.35	4.90	3.81	3.11	1704.7	4.7
45.0	3.31	3.79	4.32	4.82	5.07	5.34	5.54	5.68	5.29	4.94	3.89	3.18	1679.5	4.6
50.0	3.35	3.78	4.25	4.66	4.84	5.07	5.27	5.49	5.21	4.94	3.94	3.24	1644.9	4.5
60.0	3.36	3.70	4.03	4.27	4.31	4.44	4.67	5.02	4.95	4.86	3.97	3.29	1548.1	4.2
70.0	3.29	3.54	3.73	3.80	3.69	3.74	3.98	4.44	4.58	4.66	3.89	3.25	1417.9	3.9
80.0	3.14	3.29	3.35	3.25	3.06	3.04	3.27	3.77	4.10	4.35	3.73	3.14	1262.2	3.5
90.0	2.92	2.97	2.91	2.66	2.39	2.34	2.52	3.05	3.54	3.94	3.46	2.94	1083.8	3.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ST. LOUIS MO  
 LATITUDE: 38 DEGREES 45 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.98	2.80	3.79	4.94	5.90	6.60	6.46	5.73	4.59	3.47	2.26	1.67	1528.9	4.2
10.0	2.33	3.12	4.06	5.09	5.94	6.59	6.51	5.93	4.96	3.95	2.71	2.02	1620.9	4.4
15.0	2.49	3.26	4.16	5.13	5.91	6.53	6.47	5.98	5.11	4.16	2.91	2.18	1653.5	4.5
20.0	2.63	3.39	4.24	5.13	5.85	6.43	6.41	6.00	5.22	4.34	3.09	2.33	1676.7	4.6
25.0	2.76	3.49	4.30	5.11	5.76	6.30	6.30	5.98	5.30	4.50	3.25	2.46	1690.3	4.6
30.0	2.87	3.57	4.33	5.07	5.63	6.13	6.17	5.93	5.35	4.63	3.39	2.58	1694.3	4.6
35.0	2.97	3.63	4.34	4.99	5.48	5.93	5.99	5.84	5.37	4.73	3.52	2.68	1688.7	4.6
40.0	3.04	3.67	4.32	4.89	5.30	5.70	5.79	5.73	5.36	4.81	3.62	2.76	1673.8	4.6
45.0	3.10	3.69	4.28	4.76	5.10	5.46	5.57	5.58	5.31	4.85	3.69	2.83	1651.0	4.5
50.0	3.14	3.69	4.21	4.61	4.88	5.19	5.32	5.40	5.24	4.86	3.75	2.88	1618.7	4.4
60.0	3.16	3.62	4.01	4.24	4.36	4.57	4.74	4.96	5.00	4.80	3.79	2.93	1527.2	4.2
70.0	3.11	3.47	3.73	3.79	3.76	3.87	4.06	4.41	4.64	4.62	3.73	2.91	1402.3	3.8
80.0	2.97	3.24	3.36	3.26	3.13	3.16	3.35	3.77	4.18	4.33	3.58	2.81	1251.9	3.4
90.0	2.77	2.94	2.73	2.68	2.47	2.44	2.61	3.07	3.62	3.93	3.35	2.65	1078.6	3.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: JACKSON MS  
LATITUDE: 32 DEGREES 19 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.37	3.24	4.31	5.38	6.12	6.38	6.02	5.61	4.75	4.01	2.84	2.23	1622.0	4.4
10.0	2.69	3.54	4.55	5.49	6.09	6.29	5.99	5.73	5.03	4.46	3.27	2.60	1696.4	4.6
15.0	2.83	3.66	4.63	5.49	6.02	6.20	5.92	5.73	5.12	4.64	3.46	2.76	1719.5	4.7
20.0	2.95	3.77	4.69	5.47	5.92	6.07	5.82	5.71	5.19	4.80	3.63	2.91	1733.0	4.7
25.0	3.05	3.85	4.72	5.42	5.79	5.90	5.69	5.66	5.23	4.93	3.77	3.04	1734.8	4.8
30.0	3.14	3.91	4.72	5.33	5.63	5.71	5.53	5.57	5.24	5.03	3.90	3.15	1730.8	4.7
35.0	3.21	3.95	4.70	5.22	5.44	5.49	5.35	5.45	5.22	5.10	4.00	3.25	1715.9	4.7
40.0	3.26	3.96	4.65	5.09	5.23	5.25	5.14	5.31	5.17	5.14	4.08	3.32	1692.2	4.6
45.0	3.30	3.95	4.58	4.92	5.00	4.98	4.91	5.14	5.09	5.15	4.13	3.38	1659.0	4.5
50.0	3.31	3.93	4.48	4.73	4.74	4.69	4.65	4.94	4.98	5.12	4.16	3.41	1616.6	4.4
60.0	3.28	3.80	4.21	4.28	4.14	4.05	4.07	4.46	4.67	4.98	4.13	3.42	1505.7	4.1
70.0	3.17	3.59	3.85	3.75	3.49	3.37	3.43	3.89	4.27	4.72	4.01	3.34	1365.1	3.7
80.0	2.99	3.30	3.41	3.14	2.82	2.67	2.78	3.25	3.77	4.35	3.79	3.18	1199.9	3.3
90.0	2.74	2.94	2.91	2.52	2.16	2.02	2.13	2.59	3.20	3.88	3.48	2.95	1018.8	2.8

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MERIDIAN MS  
LATITUDE: 32 DEGREES 20 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.34	3.20	4.18	5.24	5.86	6.18	5.74	5.49	4.58	3.97	2.82	2.20	1577.5	4.3
10.0	2.65	3.50	4.41	5.34	5.83	6.10	5.72	5.60	4.84	4.41	3.25	2.57	1650.0	4.5
15.0	2.79	3.62	4.49	5.34	5.77	6.01	5.65	5.60	4.93	4.59	3.43	2.73	1672.6	4.6
20.0	2.91	3.72	4.54	5.32	5.67	5.88	5.56	5.58	4.99	4.74	3.60	2.87	1686.0	4.6
25.0	3.01	3.80	4.57	5.26	5.55	5.73	5.44	5.53	5.03	4.87	3.75	3.00	1690.0	4.6
30.0	3.10	3.86	4.57	5.18	5.40	5.54	5.29	5.44	5.03	4.97	3.87	3.11	1684.5	4.6
35.0	3.16	3.89	4.55	5.08	5.22	5.33	5.12	5.33	5.01	5.03	3.97	3.20	1670.5	4.6
40.0	3.21	3.91	4.50	4.94	5.02	5.10	4.92	5.19	4.96	5.07	4.05	3.27	1647.8	4.5
45.0	3.24	3.90	4.43	4.78	4.80	4.85	4.70	5.02	4.88	5.08	4.10	3.33	1616.1	4.4
50.0	3.26	3.87	4.34	4.60	4.55	4.57	4.46	4.82	4.77	5.05	4.12	3.36	1575.5	4.3
60.0	3.22	3.75	4.07	4.17	3.99	3.95	3.91	4.36	4.48	4.91	4.10	3.36	1468.9	4.0
70.0	3.12	3.54	3.73	3.65	3.37	3.30	3.31	3.81	4.09	4.66	3.98	3.29	1333.6	3.7
80.0	2.94	3.26	3.30	3.07	2.74	2.62	2.70	3.19	3.62	4.29	3.76	3.13	1174.4	3.2
90.0	2.69	2.90	2.82	2.46	2.11	2.00	2.08	2.55	3.08	3.83	3.45	2.90	999.5	2.7



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BILLINGS MT  
LATITUDE: 45 DEGREES 48 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.53	2.40	3.75	4.81	6.03	6.86	7.51	6.38	4.64	3.11	1.77	1.33	1528.4	4.2
10.0	1.92	2.78	4.12	5.04	6.15	6.93	7.69	6.76	5.17	3.71	2.26	1.74	1654.8	4.5
15.0	2.09	2.95	4.27	5.11	6.17	6.90	7.72	6.89	5.39	3.98	2.49	1.93	1704.0	4.7
20.0	2.25	3.10	4.40	5.15	6.14	6.85	7.70	6.98	5.58	4.22	2.70	2.12	1743.5	4.8
25.0	2.40	3.23	4.51	5.17	6.09	6.76	7.64	7.02	5.74	4.44	2.89	2.28	1772.8	4.9
30.0	2.54	3.35	4.58	5.15	6.00	6.63	7.52	7.02	5.86	4.63	3.06	2.44	1791.5	4.9
35.0	2.66	3.44	4.63	5.11	5.88	6.46	7.37	6.98	5.94	4.79	3.22	2.57	1799.5	4.9
40.0	2.76	3.51	4.66	5.04	5.72	6.25	7.17	6.90	5.99	4.92	3.35	2.70	1796.9	4.9
45.0	2.84	3.57	4.65	4.95	5.54	6.01	6.93	6.77	5.99	5.02	3.47	2.80	1783.4	4.9
50.0	2.91	3.60	4.62	4.83	5.34	5.76	6.67	6.61	5.97	5.08	3.56	2.89	1761.6	4.8
60.0	2.99	3.59	4.48	4.51	4.86	5.18	6.04	6.18	5.80	5.11	3.67	3.00	1687.6	4.6
70.0	2.99	3.50	4.23	4.10	4.28	4.49	5.28	5.60	5.49	5.01	3.68	3.03	1574.2	4.3
80.0	2.92	3.32	3.89	3.61	3.62	3.75	4.41	4.90	5.04	4.78	3.60	2.99	1425.5	3.9
90	2.77	3.07	3.46	3.05	2.96	2.99	3.53	4.09	4.48	4.43	3.42	2.86	1251.1	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CUT BANK  
LATITUDE: 48 DEGREES 36 MINUTES

MT

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.27	2.17	3.55	4.68	5.94	6.45	7.21	5.98	4.26	2.75	1.51	1.05	1427.7	3.9
10.0	1.62	2.55	3.95	4.94	6.09	6.54	7.42	6.37	4.79	3.33	1.99	1.43	1555.2	4.3
15.0	1.78	2.72	4.11	5.02	6.12	6.53	7.46	6.51	5.01	3.59	2.21	1.61	1605.9	4.4
20.0	1.93	2.87	4.25	5.08	6.11	6.49	7.46	6.61	5.21	3.83	2.42	1.78	1647.6	4.5
25.0	2.08	3.01	4.37	5.11	6.07	6.42	7.42	6.67	5.37	4.05	2.61	1.94	1679.9	4.6
30.0	2.20	3.13	4.46	5.11	6.00	6.31	7.33	6.69	5.50	4.24	2.78	2.08	1702.2	4.7
35.0	2.32	3.23	4.52	5.09	5.89	6.17	7.20	6.67	5.60	4.41	2.94	2.21	1714.4	4.7
40.0	2.42	3.31	4.56	5.03	5.76	6.00	7.03	6.61	5.66	4.54	3.08	2.33	1716.3	4.7
45.0	2.50	3.37	4.57	4.95	5.59	5.79	6.82	6.51	5.68	4.65	3.20	2.43	1708.1	4.7
50.0	2.57	3.41	4.55	4.84	5.39	5.56	6.57	6.38	5.67	4.73	3.29	2.52	1690.3	4.6
60.0	2.65	3.43	4.44	4.55	4.94	5.04	6.01	6.00	5.55	4.79	3.42	2.64	1628.7	4.5
70.0	2.67	3.36	4.22	4.17	4.39	4.42	5.31	5.49	5.29	4.73	3.46	2.69	1528.8	4.2
80.0	2.62	3.22	3.91	3.70	3.76	3.73	4.50	4.85	4.89	4.54	3.40	2.67	1393.9	3.8
90.0	2.50	2.99	3.51	3.15	3.10	3.04	3.66	4.10	4.38	4.24	3.25	2.58	1232.9	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DILLON MT  
LATITUDE: 45 DEGREES 15 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.66	2.66	4.03	5.17	6.27	6.75	7.54	6.38	4.79	3.23	1.90	1.42	1579.6	4.3
10.0	2.08	3.10	4.45	5.42	6.40	6.81	7.72	6.75	5.34	3.85	2.43	1.86	1712.7	4.7
15.0	2.27	3.29	4.62	5.50	6.41	6.79	7.74	6.87	5.57	4.12	2.67	2.06	1764.8	4.8
20.0	2.45	3.46	4.76	5.55	6.39	6.73	7.72	6.95	5.77	4.37	2.89	2.25	1806.7	4.9
25.0	2.61	3.61	4.87	5.57	6.33	6.64	7.65	6.99	5.92	4.60	3.10	2.43	1837.8	5.0
30.0	2.76	3.74	4.96	5.56	6.23	6.50	7.53	6.99	6.05	4.79	3.29	2.59	1858.0	5.1
35.0	2.89	3.85	5.02	5.51	6.10	6.34	7.37	6.94	6.13	4.95	3.46	2.73	1867.0	5.1
40.0	3.00	3.94	5.04	5.44	5.93	6.13	7.16	6.86	6.17	5.08	3.60	2.86	1864.8	5.1
45.0	3.09	4.00	5.04	5.33	5.74	5.89	6.92	6.73	6.18	5.18	3.72	2.97	1851.4	5.1
50.0	3.16	4.03	5.01	5.20	5.53	5.65	6.65	6.57	6.15	5.25	3.82	3.06	1829.4	5.0
60.0	3.25	4.03	4.85	4.85	5.02	5.07	6.02	6.13	5.97	5.28	3.94	3.18	1753.1	4.8
70.0	3.25	3.93	4.58	4.40	4.41	4.39	5.25	5.55	5.64	5.17	3.95	3.21	1635.5	4.5
80.0	3.17	3.73	4.20	3.86	3.71	3.66	4.37	4.84	5.18	4.93	3.86	3.16	1481.0	4.1
90.0	3.00	3.44	3.73	3.25	3.02	2.92	3.49	4.03	4.59	4.56	3.67	3.03	1299.5	3.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KNH/SQ. M)

SITE: GLASGOW MT  
LATITUDE: 48 DEGREES 13 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.22	2.12	3.48	4.69	5.76	6.45	6.91	5.88	4.22	2.76	1.51	1.05	1404.5	3.8
10.0	1.54	2.47	3.85	4.94	5.90	6.54	7.10	6.25	4.74	3.34	1.96	1.42	1526.0	4.2
15.0	1.69	2.63	4.01	5.02	5.92	6.52	7.14	6.38	4.96	3.60	2.17	1.59	1573.9	4.3
20.0	1.83	2.78	4.14	5.08	5.91	6.48	7.14	6.47	5.14	3.83	2.37	1.75	1613.2	4.4
25.0	1.95	2.90	4.25	5.11	5.87	6.41	7.09	6.53	5.30	4.05	2.55	1.90	1643.2	4.5
30.0	2.07	3.01	4.33	5.11	5.80	6.30	7.01	6.55	5.42	4.24	2.72	2.04	1663.6	4.6
35.0	2.17	3.11	4.39	5.08	5.69	6.16	6.88	6.52	5.51	4.40	2.87	2.16	1674.2	4.6
40.0	2.26	3.18	4.42	5.02	5.56	5.98	6.71	6.46	5.57	4.33	3.00	2.28	1674.8	4.6
45.0	2.33	3.24	4.43	4.93	5.39	5.77	6.51	6.36	5.59	4.63	3.11	2.37	1665.5	4.6
50.0	2.39	3.27	4.41	4.82	5.20	5.54	6.27	6.22	5.58	4.71	3.20	2.45	1647.3	4.5
60.0	2.47	3.28	4.30	4.53	4.77	5.02	5.73	5.85	5.45	4.76	3.32	2.57	1585.1	4.3
70.0	2.48	3.22	4.08	4.15	4.24	4.40	5.07	5.34	5.18	4.69	3.35	2.61	1486.1	4.1
80.0	2.43	3.07	3.77	3.67	3.62	3.71	4.29	4.72	4.79	4.50	3.29	2.59	1353.4	3.7
90.0	2.31	2.85	3.38	3.11	2.99	3.01	3.50	3.99	4.29	4.20	3.15	2.49	1195.8	3.3

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: GREAT FALLS MT  
LATITUDE: 47 DEGREES 29 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.33	2.27	3.69	4.69	5.83	6.63	7.34	6.09	4.35	2.91	1.57	1.06	1456.0	4.0
10.0	1.67	2.65	4.08	4.93	5.96	6.71	7.54	6.48	4.87	3.51	2.02	1.40	1579.9	4.3
15.0	1.83	2.82	4.25	5.01	5.98	6.70	7.57	6.61	5.09	3.78	2.23	1.56	1628.6	4.5
20.0	1.97	2.98	4.39	5.06	5.97	6.65	7.57	6.70	5.27	4.02	2.43	1.70	1668.1	4.6
25.0	2.11	3.11	4.50	5.09	5.92	6.57	7.52	6.76	5.43	4.24	2.61	1.84	1698.0	4.7
30.0	2.23	3.23	4.59	5.08	5.84	6.46	7.42	6.77	5.55	4.44	2.78	1.97	1717.8	4.7
35.0	2.34	3.33	4.65	5.05	5.73	6.30	7.28	6.74	5.64	4.60	2.93	2.09	1727.5	4.7
40.0	2.44	3.41	4.69	4.99	5.59	6.12	7.10	6.67	5.69	4.74	3.06	2.19	1726.8	4.7
45.0	2.52	3.46	4.69	4.90	5.42	5.90	6.88	6.56	5.71	4.84	3.16	2.27	1715.9	4.7
50.0	2.58	3.50	4.67	4.79	5.23	5.66	6.62	6.42	5.69	4.92	3.25	2.35	1696.1	4.6
60.0	2.66	3.51	4.54	4.49	4.78	5.11	6.03	6.03	5.55	4.97	3.37	2.44	1629.1	4.5
70.0	2.66	3.44	4.31	4.10	4.24	4.47	5.31	5.49	5.27	4.89	3.39	2.48	1524.2	4.2
80.0	2.61	3.28	3.98	3.63	3.62	3.75	4.47	4.83	4.87	4.69	3.32	2.45	1384.7	3.8
90.0	2.48	3.04	3.56	3.08	2.98	3.03	3.62	4.07	4.35	4.36	3.17	2.35	1219.9	3.3

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: HELENA  
MT  
LATITUDE: 46 DEGREES 36 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.32	2.23	3.61	4.69	5.86	6.43	7.35	6.08	4.45	2.92	1.64	1.15	1456.3	4.0
10.0	1.64	2.58	3.97	4.92	5.99	6.50	7.54	6.45	4.97	3.49	2.10	1.50	1575.2	4.3
15.0	1.79	2.74	4.12	4.99	6.00	6.48	7.57	6.57	5.19	3.74	2.31	1.67	1621.4	4.4
20.0	1.92	2.88	4.25	5.04	5.99	6.43	7.56	6.66	5.37	3.98	2.51	1.82	1658.6	4.5
25.0	2.04	3.00	4.35	5.06	5.94	6.35	7.50	6.70	5.53	4.18	2.69	1.97	1686.1	4.6
30.0	2.16	3.11	4.43	5.05	5.85	6.24	7.40	6.71	5.65	4.36	2.86	2.10	1703.7	4.7
35.0	2.25	3.20	4.48	5.01	5.74	6.08	7.25	6.67	5.73	4.52	3.00	2.22	1711.2	4.7
40.0	2.34	3.26	4.50	4.95	5.59	5.90	7.06	6.60	5.78	4.64	3.13	2.32	1708.2	4.7
45.0	2.41	3.31	4.50	4.85	5.42	5.68	6.83	6.48	5.79	4.74	3.24	2.41	1605.9	4.6
50.0	2.46	3.34	4.48	4.74	5.22	5.45	6.58	6.33	5.77	4.80	3.32	2.48	1674.9	4.6
60.0	2.53	3.34	4.34	4.44	4.76	4.92	5.98	5.93	5.61	4.84	3.43	2.58	1605.2	4.4
70.0	2.53	3.26	4.11	4.04	4.21	4.29	5.24	5.39	5.32	4.75	3.45	2.61	1498.3	4.1
80.0	2.46	3.10	3.78	3.57	3.58	3.60	4.40	4.73	4.90	4.54	3.38	2.57	1358.0	3.7
90.0	2.34	2.87	3.37	3.02	2.94	2.90	3.54	3.97	4.36	4.21	3.21	2.47	1193.4	3.3

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJH/SQ. M)

SITE: LEWISLOW MT  
LATITUDE: 47 DEGREES 3 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.32	2.18	3.56	4.56	5.70	6.49	7.21	5.99	4.32	2.85	1.58	1.14	1430.8	3.9
10.0	1.65	2.53	3.92	4.78	5.82	6.57	7.40	6.36	4.83	3.42	2.03	1.51	1549.4	4.2
15.0	1.81	2.68	4.07	4.85	5.84	6.55	7.43	6.48	5.04	3.67	2.24	1.68	1595.7	4.4
20.0	1.95	2.82	4.20	4.90	5.82	6.50	7.42	6.57	5.22	3.90	2.43	1.85	1633.2	4.5
25.0	2.08	2.94	4.30	4.92	5.78	6.42	7.37	6.62	5.37	4.10	2.61	2.00	1661.2	4.6
30.0	2.19	3.05	4.38	4.91	5.70	6.31	7.27	6.62	5.48	4.28	2.77	2.13	1679.5	4.6
35.0	2.30	3.14	4.43	4.88	5.59	6.15	7.13	6.59	5.57	4.44	2.91	2.26	1687.8	4.6
40.0	2.39	3.20	4.46	4.81	5.45	5.97	6.95	6.52	5.61	4.56	3.04	2.37	1686.2	4.6
45.0	2.46	3.25	4.46	4.73	5.28	5.75	6.72	6.41	5.63	4.66	3.14	2.46	1674.7	4.6
50.0	2.52	3.28	4.43	4.62	5.09	5.52	6.48	6.27	5.61	4.72	3.23	2.54	1654.7	4.5
60.0	2.59	3.29	4.31	4.33	4.65	4.99	5.89	5.87	5.46	4.76	3.34	2.65	1587.8	4.4
70.0	2.60	3.21	4.08	3.95	4.12	4.35	5.18	5.35	5.18	4.68	3.35	2.68	1484.3	4.1
80.0	2.54	3.05	3.76	3.49	3.52	3.65	4.36	4.70	4.78	4.48	3.29	2.65	1347.5	3.7
90.0	2.41	2.83	3.36	2.96	2.89	2.95	3.52	3.95	4.26	4.16	3.13	2.54	1186.5	3.3

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MILES CITY M1  
LATITUDE: 46 DEGREES 26 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.44	2.35	3.73	4.86	5.98	6.76	7.22	6.23	4.55	3.03	1.74	1.26	1498.5	4.1
10.0	1.80	2.73	4.11	5.10	6.10	6.84	7.40	6.61	5.08	3.63	2.24	1.66	1624.9	4.5
15.0	1.97	2.89	4.27	5.18	6.12	6.82	7.43	6.74	5.31	3.89	2.47	1.85	1674.4	4.6
20.0	2.13	3.04	4.40	5.23	6.10	6.77	7.41	6.83	5.50	4.14	2.68	2.02	1714.4	4.7
25.0	2.27	3.18	4.51	5.25	6.05	6.68	7.36	6.88	5.65	4.35	2.88	2.19	1744.5	4.8
30.0	2.40	3.29	4.59	5.24	5.97	6.55	7.25	6.88	5.77	4.54	3.06	2.34	1764.1	4.8
35.0	2.51	3.39	4.64	5.20	5.85	6.39	7.11	6.85	5.86	4.71	3.22	2.47	1773.3	4.9
40.0	2.61	3.46	4.67	5.13	5.70	6.19	6.92	6.77	5.91	4.84	3.36	2.59	1771.9	4.9
45.0	2.69	3.52	4.67	5.04	5.52	5.96	6.69	6.65	5.92	4.94	3.48	2.70	1760.0	4.8
50.0	2.75	3.55	4.64	4.92	5.32	5.72	6.45	6.50	5.90	5.01	3.57	2.78	1739.4	4.8
60.0	2.83	3.55	4.51	4.60	4.85	5.15	5.86	6.08	5.74	5.04	3.69	2.90	1668.9	4.6
70.0	2.83	3.46	4.26	4.19	4.28	4.48	5.14	5.53	5.44	4.95	3.71	2.93	1559.5	4.3
80.0	2.77	3.29	3.92	3.69	3.63	3.74	4.31	4.84	5.01	4.73	3.64	2.89	1415.0	3.9
90.0	2.63	3.05	3.50	3.13	2.98	3.00	3.47	4.06	4.46	4.39	3.46	2.78	1244.7	3.4



AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: MISSOULA MT  
 LATITUDE: 46 DEGREES 55 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.99	1.81	3.09	4.36	5.62	6.09	7.34	5.93	4.28	2.56	1.29	0.84	1348.9	3.7
10.0	1.16	2.06	3.38	4.57	5.74	6.16	7.53	6.29	4.77	3.02	1.61	1.05	1443.8	4.0
15.0	1.24	2.16	3.49	4.63	5.76	6.14	7.56	6.41	4.97	3.23	1.76	1.14	1479.4	4.1
20.0	1.32	2.26	3.59	4.67	5.74	6.09	7.55	6.49	5.15	3.42	1.89	1.23	1506.9	4.1
25.0	1.38	2.34	3.67	4.69	5.69	6.02	7.49	6.54	5.29	3.58	2.02	1.31	1525.9	4.2
30.0	1.44	2.41	3.73	4.68	5.61	5.91	7.39	6.54	5.40	3.73	2.13	1.38	1536.1	4.2
35.0	1.50	2.47	3.76	4.65	5.51	5.77	7.25	6.51	5.48	3.85	2.23	1.45	1537.4	4.2
40.0	1.54	2.51	3.78	4.58	5.37	5.60	7.06	6.44	5.53	3.95	2.31	1.51	1529.8	4.2
45.0	1.57	2.54	3.77	4.50	5.20	5.39	6.84	6.33	5.54	4.02	2.38	1.55	1513.4	4.1
50.0	1.60	2.56	3.75	4.39	5.02	5.18	6.58	6.18	5.52	4.07	2.44	1.59	1489.8	4.1
60.0	1.62	2.54	3.63	4.12	4.58	4.68	5.99	5.80	5.37	4.09	2.51	1.64	1419.1	3.9
70.0	1.61	2.47	3.43	3.75	4.06	4.10	5.26	5.28	5.09	4.01	2.51	1.65	1316.5	3.6
80.0	1.55	2.34	3.16	3.32	3.46	3.45	4.42	4.64	4.69	3.82	2.45	1.61	1185.6	3.2
90.0	1.47	2.16	2.82	2.82	2.85	2.80	3.56	3.90	4.18	3.55	2.33	1.54	1035.0	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ASHEVILLE  
LATITUDE: 35 DEGREES 26 MINUTES NC

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.27	3.07	4.12	5.26	5.69	5.85	5.59	5.13	4.28	3.62	2.67	2.07	1510.8	4.1
10.0	2.63	3.39	4.38	5.39	5.69	5.81	5.59	5.26	4.56	4.05	3.15	2.47	1594.1	4.4
15.0	2.78	3.53	4.47	5.42	5.65	5.74	5.55	5.28	4.65	4.24	3.36	2.65	1622.7	4.4
20.0	2.93	3.64	4.54	5.41	5.57	5.64	5.47	5.27	4.73	4.40	3.55	2.81	1642.3	4.5
25.0	3.05	3.74	4.58	5.37	5.47	5.50	5.37	5.23	4.77	4.53	3.72	2.96	1652.7	4.5
30.0	3.16	3.81	4.60	5.31	5.33	5.35	5.24	5.17	4.79	4.64	3.86	3.09	1653.9	4.5
35.0	3.25	3.86	4.60	5.21	5.17	5.16	5.08	5.07	4.79	4.71	3.99	3.20	1645.8	4.5
40.0	3.32	3.89	4.56	5.09	4.99	4.96	4.90	4.96	4.75	4.76	4.08	3.29	1629.9	4.5
45.0	3.37	3.90	4.50	4.94	4.79	4.74	4.70	4.81	4.69	4.79	4.16	3.36	1605.1	4.4
50.0	3.40	3.88	4.42	4.77	4.57	4.49	4.48	4.64	4.60	4.78	4.20	3.41	1571.3	4.3
60.0	3.39	3.78	4.18	4.35	4.05	3.93	3.97	4.24	4.35	4.68	4.22	3.44	1478.3	4.1
70.0	3.31	3.60	3.85	3.84	3.46	3.33	3.39	3.74	4.01	4.46	4.13	3.39	1354.3	3.7
80.0	3.15	3.34	3.45	3.27	2.86	2.72	2.81	3.18	3.58	4.15	3.93	3.26	1206.5	3.3
90.0	2.91	3.00	2.97	2.65	2.23	2.12	2.20	2.59	3.08	3.73	3.64	3.05	1038.2	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CAPE HATTERAS NC  
LATITUDE: 35 DEGREES 16 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.15	3.00	4.18	5.60	6.18	6.42	6.05	5.38	4.63	3.59	2.74	2.08	1583.8	4.3
10.0	2.48	3.31	4.44	5.74	6.19	6.37	6.06	5.52	4.94	4.01	3.24	2.47	1667.7	4.6
15.0	2.62	3.44	4.54	5.77	6.14	6.29	6.01	5.54	5.06	4.19	3.45	2.65	1695.8	4.6
20.0	2.75	3.55	4.61	5.76	6.06	6.17	5.92	5.53	5.14	4.35	3.65	2.81	1714.3	4.7
25.0	2.86	3.64	4.65	5.72	5.94	6.03	5.81	5.50	5.20	4.48	3.83	2.96	1723.2	4.7
30.0	2.96	3.71	4.67	5.65	5.79	5.84	5.66	5.43	5.22	4.58	3.98	3.08	1722.3	4.7
35.0	3.04	3.76	4.66	5.55	5.61	5.63	5.49	5.33	5.22	4.66	4.11	3.19	1711.6	4.7
40.0	3.10	3.78	4.63	5.42	5.41	5.41	5.29	5.20	5.18	4.71	4.21	3.28	1692.9	4.6
45.0	3.14	3.79	4.57	5.26	5.19	5.15	5.07	5.05	5.12	4.73	4.29	3.35	1664.7	4.6
50.0	3.17	3.77	4.48	5.08	4.93	4.88	4.82	4.87	5.03	4.72	4.33	3.40	1627.3	4.5
60.0	3.16	3.67	4.24	4.62	4.36	4.25	4.26	4.44	4.75	4.61	4.35	3.43	1525.6	4.2
70.0	3.07	3.49	3.91	4.08	3.70	3.57	3.62	3.92	4.37	4.40	4.26	3.38	1391.7	3.8
80.0	2.92	3.23	3.49	3.45	3.03	2.87	2.97	3.32	3.90	4.08	4.06	3.25	1233.6	3.4
90.0	2.69	2.91	3.00	2.78	2.33	2.20	2.29	2.68	3.34	3.67	3.76	3.03	1054.9	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CHARLOTTE  
NC  
LATITUDE: 35 DEGREES 13 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.26	3.07	4.14	5.35	5.85	6.06	5.77	5.35	4.46	3.70	2.72	2.12	1548.5	4.2
10.0	2.61	3.39	4.40	5.48	5.85	6.01	5.77	5.49	4.75	4.15	3.21	2.53	1633.1	4.5
15.0	2.76	3.52	4.50	5.51	5.80	5.93	5.72	5.51	4.85	4.34	3.42	2.71	1661.9	4.6
20.0	2.90	3.63	4.57	5.50	5.72	5.83	5.65	5.50	4.93	4.50	3.61	2.88	1681.5	4.6
25.0	3.03	3.73	4.61	5.46	5.61	5.69	5.54	5.46	4.98	4.64	3.79	3.03	1691.5	4.6
30.0	3.13	3.80	4.63	5.39	5.47	5.52	5.40	5.39	5.01	4.75	3.94	3.16	1692.1	4.6
35.0	3.22	3.85	4.62	5.29	5.30	5.32	5.23	5.30	5.00	4.83	4.06	3.27	1683.1	4.6
40.0	3.28	3.88	4.59	5.17	5.12	5.12	5.05	5.17	4.96	4.88	4.16	3.37	1666.2	4.6
45.0	3.33	3.88	4.53	5.02	4.91	4.88	4.84	5.02	4.90	4.91	4.23	3.44	1640.0	4.5
50.0	3.36	3.87	4.44	4.84	4.67	4.62	4.61	4.84	4.81	4.90	4.28	3.49	1604.7	4.4
60.0	3.35	3.77	4.20	4.41	4.14	4.04	4.08	4.41	4.55	4.80	4.29	3.53	1507.8	4.1
70.0	3.27	3.58	3.87	3.89	3.52	3.41	3.47	3.89	4.18	4.58	4.20	3.47	1379.2	3.8
80.0	3.10	3.32	3.46	3.30	2.90	2.76	2.86	3.30	3.73	4.25	4.00	3.34	1226.3	3.4
90.0	2.87	2.98	2.98	2.67	2.26	2.14	2.23	2.67	3.20	3.82	3.70	3.12	1052.8	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CHERRY POINT NC  
LATITUDE: 34 DEGREES 54 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.38	3.23	4.37	5.66	6.06	6.11	5.76	5.15	4.49	3.69	2.85	2.27	1584.1	4.3
10.0	2.76	3.58	4.65	5.80	6.06	6.06	5.76	5.28	4.78	4.13	3.36	2.71	1672.0	4.6
15.0	2.92	3.72	4.75	5.83	6.01	5.98	5.71	5.29	4.89	4.32	3.59	2.91	1702.1	4.7
20.0	3.07	3.84	4.82	5.82	5.93	5.87	5.63	5.28	4.96	4.48	3.80	3.09	1722.6	4.7
25.0	3.20	3.94	4.87	5.78	5.81	5.73	5.52	5.24	5.01	4.61	3.98	3.25	1733.4	4.7
30.0	3.32	4.02	4.89	5.70	5.66	5.56	5.38	5.18	5.03	4.72	4.14	3.39	1734.4	4.8
35.0	3.41	4.08	4.88	5.60	5.49	5.36	5.21	5.08	5.03	4.79	4.27	3.52	1725.6	4.7
40.0	3.48	4.11	4.85	5.47	5.29	5.15	5.03	4.96	4.99	4.84	4.38	3.62	1708.6	4.7
45.0	3.53	4.11	4.78	5.31	5.07	4.91	4.82	4.81	4.92	4.86	4.46	3.70	1682.0	4.6
50.0	3.56	4.10	4.69	5.11	4.82	4.65	4.59	4.64	4.83	4.85	4.51	3.75	1646.0	4.5
60.0	3.56	3.99	4.44	4.65	4.26	4.05	4.05	4.23	4.56	4.75	4.52	3.79	1546.8	4.2
70.0	3.47	3.80	4.08	4.09	3.61	3.42	3.45	3.73	4.19	4.52	4.43	3.74	1414.9	3.9
80.0	3.29	3.51	3.64	3.46	2.96	2.76	2.84	3.17	3.74	4.20	4.22	3.59	1257.9	3.4
90.0	3.04	3.15	3.13	2.78	2.29	2.13	2.21	2.57	3.20	3.77	3.90	3.35	1079.8	3.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: GREENSBORO NC  
LATITUDE: 36 DEGREES 5 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.25	3.06	4.13	5.31	5.88	6.16	5.87	5.35	4.46	3.60	2.64	2.08	1546.8	4.2
10.0	2.62	3.39	4.40	5.45	5.89	6.12	5.88	5.50	4.77	4.05	3.13	2.49	1634.7	4.5
15.0	2.78	3.53	4.50	5.48	5.85	6.05	5.84	5.52	4.88	4.24	3.34	2.68	1665.2	4.6
20.0	2.92	3.65	4.58	5.47	5.78	5.94	5.77	5.52	4.97	4.40	3.54	2.85	1686.3	4.6
25.0	3.05	3.75	4.63	5.44	5.67	5.81	5.66	5.49	5.02	4.54	3.71	3.01	1697.9	4.7
30.0	3.17	3.83	4.65	5.37	5.53	5.64	5.52	5.42	5.05	4.65	3.87	3.14	1699.9	4.7
35.0	3.26	3.88	4.65	5.28	5.37	5.44	5.35	5.33	5.05	4.74	3.99	3.26	1692.2	4.6
40.0	3.33	3.92	4.62	5.16	5.18	5.23	5.17	5.21	5.02	4.79	4.10	3.36	1676.4	4.6
45.0	3.39	3.93	4.56	5.02	4.98	5.00	4.96	5.06	4.96	4.82	4.18	3.43	1651.4	4.5
50.0	3.42	3.91	4.48	4.84	4.74	4.74	4.73	4.88	4.87	4.81	4.23	3.49	1617.2	4.4
60.0	3.42	3.82	4.25	4.42	4.21	4.15	4.19	4.46	4.62	4.72	4.25	3.53	1522.2	4.2
70.0	3.34	3.64	3.92	3.92	3.59	3.50	3.58	3.94	4.26	4.51	4.17	3.49	1394.8	3.8
80.0	3.18	3.38	3.51	3.33	2.97	2.85	2.95	3.35	3.80	4.20	3.98	3.36	1242.5	3.4
90.0	2.95	3.04	3.03	2.71	2.31	2.20	2.30	2.72	3.27	3.78	3.69	3.14	1068.5	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: RALEIGH-DURHAM NC  
 LATITUDE: 35 DEGREES 52 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.18	2.98	4.02	5.19	5.70	5.88	5.59	5.08	4.34	3.49	2.55	2.00	1491.8	4.1
10.0	2.53	3.29	4.27	5.32	5.71	5.84	5.60	5.21	4.62	3.91	3.00	2.39	1573.6	4.3
15.0	2.68	3.42	4.36	5.35	5.67	5.77	5.55	5.23	4.73	4.08	3.20	2.57	1601.7	4.4
20.0	2.81	3.54	4.43	5.34	5.59	5.67	5.48	5.23	4.81	4.24	3.38	2.72	1620.8	4.4
25.0	2.94	3.63	4.48	5.31	5.49	5.54	5.38	5.19	4.86	4.36	3.54	2.87	1630.9	4.5
30.0	3.04	3.70	4.50	5.24	5.36	5.38	5.25	5.13	4.88	4.47	3.68	2.99	1631.9	4.5
35.0	3.12	3.75	4.49	5.15	5.20	5.20	5.09	5.04	4.88	4.54	3.80	3.10	1623.8	4.4
40.0	3.19	3.78	4.46	5.03	5.02	5.00	4.92	4.92	4.85	4.59	3.89	3.19	1607.9	4.4
45.0	3.24	3.79	4.41	4.89	4.82	4.77	4.72	4.78	4.79	4.61	3.96	3.26	1583.4	4.3
50.0	3.27	3.77	4.33	4.72	4.59	4.53	4.50	4.62	4.70	4.61	4.01	3.31	1550.1	4.2
60.0	3.27	3.68	4.10	4.31	4.08	3.97	4.00	4.22	4.45	4.51	4.02	3.34	1458.4	4.0
70.0	3.19	3.50	3.78	3.82	3.49	3.37	3.42	3.73	4.10	4.31	3.93	3.30	1336.1	3.7
80.0	3.03	3.25	3.38	3.25	2.89	2.75	2.83	3.18	3.66	4.00	3.75	3.17	1190.4	3.3
90.0	2.81	2.93	2.92	2.64	2.26	2.14	2.22	2.59	3.15	3.61	3.48	2.97	1024.4	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BISMARCK ND  
LATITUDE: 46 DEGREES 46 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.47	2.44	3.58	4.60	5.83	6.49	6.88	5.92	4.27	2.86	1.60	1.17	1439.4	3.9
10.0	1.86	2.86	4.06	4.82	5.95	6.56	7.05	6.27	4.75	3.42	2.05	1.55	1560.2	4.3
15.0	2.04	3.04	4.21	4.89	5.97	6.54	7.08	6.39	4.95	3.66	2.25	1.72	1607.6	4.4
20.0	2.20	3.21	4.35	4.94	5.95	6.50	7.06	6.47	5.13	3.89	2.44	1.89	1646.1	4.5
25.0	2.35	3.35	4.45	4.96	5.90	6.41	7.01	6.52	5.27	4.09	2.62	2.04	1675.1	4.6
30.0	2.49	3.48	4.53	4.95	5.82	6.30	6.91	6.52	5.38	4.27	2.78	2.18	1694.1	4.6
35.0	2.61	3.59	4.59	4.91	5.71	6.14	6.78	6.49	5.46	4.42	2.92	2.31	1703.3	4.7
40.0	2.72	3.67	4.52	4.85	5.56	5.96	6.67	6.41	5.50	4.54	3.05	2.42	1702.3	4.7
45.0	2.81	3.73	4.62	4.76	5.39	5.74	6.39	6.30	5.51	4.63	3.15	2.51	1691.3	4.6
50.0	2.88	3.77	4.59	4.64	5.20	5.51	6.16	6.16	5.49	4.69	3.23	2.59	1671.9	4.6
60.0	2.96	3.78	4.46	4.35	4.74	4.97	5.60	5.77	5.34	4.73	3.34	2.70	1605.6	4.4
70.0	2.97	3.69	4.22	3.97	4.20	4.33	4.93	5.25	5.06	4.64	3.35	2.73	1502.1	4.1
80.0	2.91	3.52	3.89	3.50	3.57	3.64	4.15	4.61	4.66	4.44	3.28	2.70	1365.1	3.7
90.0	2.76	3.26	3.47	2.97	2.93	2.93	3.37	3.87	4.15	4.12	3.13	2.59	1203.3	3.3



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: FARGO ND  
LATITUDE: 46 DEGREES 54 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.31	2.22	3.46	4.65	5.78	6.28	6.68	5.75	4.11	2.75	1.44	1.06	1387.3	3.8
10.0	1.63	2.58	3.80	4.88	5.90	6.35	6.84	6.09	4.57	3.28	1.83	1.38	1497.5	4.1
15.0	1.77	2.74	3.94	4.95	5.92	6.33	6.87	6.20	4.76	3.51	2.00	1.53	1540.2	4.2
20.0	1.91	2.88	4.06	5.00	5.90	6.28	6.85	6.28	4.92	3.72	2.16	1.67	1574.5	4.3
25.0	2.04	3.01	4.16	5.02	5.86	6.21	6.80	6.32	5.06	3.91	2.32	1.80	1599.7	4.4
30.0	2.15	3.12	4.23	5.01	5.78	6.09	6.71	6.32	5.16	4.08	2.45	1.92	1615.6	4.4
35.0	2.25	3.21	4.28	4.98	5.67	5.95	6.58	6.29	5.23	4.22	2.57	2.02	1622.2	4.4
40.0	2.33	3.28	4.31	4.91	5.52	5.77	6.41	6.22	5.27	4.34	2.68	2.12	1619.2	4.4
45.0	2.41	3.33	4.30	4.82	5.35	5.56	6.20	6.11	5.28	4.42	2.77	2.20	1606.8	4.4
50.0	2.46	3.36	4.28	4.71	5.16	5.33	5.98	5.97	5.26	4.48	2.84	2.26	1586.5	4.3
60.0	2.53	3.36	4.15	4.41	4.71	4.82	5.44	5.60	5.11	4.51	2.92	2.35	1520.3	4.2
70.0	2.53	3.28	3.93	4.02	4.17	4.21	4.80	5.09	4.85	4.43	2.93	2.38	1419.5	3.9
80.0	2.47	3.12	3.62	3.55	3.55	3.54	4.05	4.48	4.46	4.23	2.87	2.34	1287.4	3.5
90.0	2.35	2.89	3.23	3.02	2.92	2.87	3.29	3.77	3.98	3.93	2.73	2.25	1132.6	3.1

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MINOT ND  
LATITUDE: 48 DEGREES 16 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.21	2.07	3.29	4.60	5.83	6.23	6.61	5.67	4.02	2.68	1.38	0.98	1359.2	3.7
10.0	1.53	2.41	3.63	4.85	5.96	6.31	6.79	6.03	4.50	3.23	1.78	1.30	1472.8	4.0
15.0	1.67	2.57	3.77	4.93	5.99	6.30	6.82	6.15	4.70	3.47	1.96	1.45	1517.3	4.2
20.0	1.81	2.71	3.90	4.98	5.98	6.25	6.82	6.24	4.87	3.70	2.13	1.59	1553.6	4.3
25.0	1.93	2.83	3.99	5.01	5.94	6.18	6.77	6.29	5.01	3.90	2.29	1.73	1581.1	4.3
30.0	2.04	2.94	4.07	5.01	5.87	6.08	6.69	6.30	5.12	4.08	2.44	1.85	1599.3	4.4
35.0	2.15	3.02	4.12	4.98	5.76	5.94	6.57	6.28	5.20	4.23	2.57	1.96	1608.2	4.4
40.0	2.23	3.10	4.15	4.92	5.62	5.77	6.41	6.21	5.25	4.35	2.68	2.06	1607.7	4.4
45.0	2.31	3.15	4.15	4.84	5.46	5.57	6.22	6.12	5.27	4.45	2.78	2.14	1597.8	4.4
50.0	2.36	3.18	4.13	4.73	5.27	5.35	5.99	5.93	5.26	4.52	2.85	2.21	1579.4	4.3
60.0	2.44	3.19	4.02	4.44	4.82	4.85	5.48	5.63	5.13	4.57	2.95	2.31	1518.1	4.2
70.0	2.45	3.12	3.82	4.07	4.29	4.26	4.85	5.14	4.88	4.50	2.98	2.35	1422.0	3.9
80.0	2.40	2.98	3.53	3.60	3.67	3.60	4.12	4.54	4.51	4.32	2.92	2.32	1294.2	3.5
90.0	2.28	2.77	3.16	3.07	3.02	2.93	3.37	3.85	4.04	4.03	2.79	2.23	1142.8	3.1

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KMH/SQ. M)  
 SITE: GRAND ISLAND NE  
 LATITUDE: 40 DEGREES 58 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.09	2.89	3.98	5.34	6.22	7.07	6.98	6.12	4.76	3.59	2.33	1.80	1620.0	4.4
10.0	2.53	3.29	4.30	5.55	6.29	7.08	7.07	6.38	5.20	4.16	2.88	2.26	1736.4	4.8
15.0	2.73	3.45	4.43	5.61	6.28	7.03	7.06	6.46	5.37	4.42	3.12	2.47	1780.0	4.9
20.0	2.92	3.60	4.53	5.63	6.23	6.94	7.00	6.50	5.51	4.64	3.35	2.66	1813.1	5.0
25.0	3.08	3.73	4.61	5.62	6.14	6.81	6.90	6.50	5.62	4.84	3.56	2.84	1835.7	5.0
30.0	3.23	3.84	4.66	5.59	6.02	6.65	6.77	6.46	5.70	5.01	3.74	3.01	1847.5	5.1
35.0	3.36	3.92	4.68	5.52	5.87	6.44	6.59	6.38	5.74	5.14	3.90	3.15	1848.4	5.1
40.0	3.47	3.98	4.68	5.42	5.69	6.20	6.38	6.27	5.74	5.25	4.04	3.27	1838.4	5.0
45.0	3.55	4.02	4.65	5.29	5.48	5.94	6.14	6.13	5.71	5.32	4.15	3.37	1819.5	5.0
50.0	3.62	4.03	4.59	5.14	5.26	5.66	5.88	5.95	5.65	5.35	4.23	3.45	1790.3	4.9
60.0	3.67	3.99	4.40	4.75	4.72	5.01	5.26	5.49	5.42	5.32	4.32	3.55	1701.0	4.7
70.0	3.64	3.84	4.11	4.26	4.09	4.26	4.53	4.91	5.06	5.16	4.29	3.55	1572.7	4.3
80.0	3.51	3.61	3.73	3.68	3.41	3.49	3.74	4.22	4.59	4.86	4.15	3.46	1413.0	3.9
90.0	3.30	3.29	3.27	3.04	2.71	2.69	2.93	3.45	4.01	4.45	3.90	3.28	1226.0	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: NORTH OMAHA NE  
LATITUDE: 41 DEGREES 22 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.00	2.81	3.85	4.92	5.90	6.69	6.64	5.86	4.32	3.31	2.03	1.61	1522.4	4.2
10.0	2.43	3.19	4.17	5.10	5.97	6.71	6.73	6.12	4.70	3.82	2.47	2.01	1627.8	4.5
15.0	2.62	3.36	4.29	5.15	5.96	6.67	6.72	6.19	4.85	4.05	2.67	2.20	1666.9	4.6
20.0	2.80	3.50	4.39	5.17	5.91	6.58	6.66	6.23	4.97	4.25	2.86	2.37	1696.6	4.6
25.0	2.96	3.63	4.46	5.16	5.83	6.47	6.57	6.23	5.07	4.43	3.02	2.52	1716.4	4.7
30.0	3.11	3.73	4.51	5.13	5.72	6.31	6.45	6.19	5.13	4.57	3.17	2.66	1726.4	4.7
35.0	3.23	3.82	4.53	5.06	5.58	6.12	6.28	6.12	5.16	4.69	3.30	2.78	1726.3	4.7
40.0	3.33	3.87	4.53	4.97	5.41	5.90	6.08	6.01	5.16	4.78	3.41	2.89	1716.2	4.7
45.0	3.42	3.91	4.50	4.86	5.22	5.66	5.86	5.88	5.14	4.85	3.49	2.98	1697.8	4.7
50.0	3.48	3.92	4.45	4.72	5.01	5.40	5.62	5.71	5.08	4.88	3.56	3.05	1670.2	4.6
60.0	3.54	3.88	4.26	4.37	4.51	4.79	5.04	5.27	4.87	4.85	3.62	3.13	1586.5	4.3
70.0	3.50	3.74	3.99	3.92	3.92	4.09	4.35	4.73	4.55	4.69	3.59	3.13	1467.2	4.0
80.0	3.38	3.52	3.62	3.41	3.28	3.37	3.62	4.08	4.13	4.43	3.47	3.05	1318.9	3.6
90.0	3.18	3.22	3.18	2.83	2.63	2.62	2.86	3.35	3.62	4.05	3.26	2.89	1146.0	3.1

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: NORTH PLATTE NE  
LATITUDE: 41 DEGREES 8 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.18	3.02	4.20	5.44	6.26	7.15	7.18	6.27	4.93	3.71	2.40	1.91	1663.1	4.6
10.0	2.67	3.44	4.56	5.65	6.34	7.17	7.28	6.55	5.40	4.33	2.97	2.43	1790.9	4.9
15.0	2.89	3.63	4.70	5.71	6.33	7.12	7.27	6.63	5.59	4.60	3.24	2.66	1838.6	5.0
20.0	3.09	3.79	4.81	5.74	6.28	7.03	7.21	6.68	5.74	4.84	3.48	2.89	1875.4	5.1
25.0	3.27	3.93	4.90	5.74	6.19	6.90	7.11	6.68	5.86	5.05	3.70	3.09	1901.2	5.2
30.0	3.44	4.04	4.96	5.70	6.07	6.73	6.97	6.64	5.94	5.23	3.90	3.27	1915.7	5.2
35.0	3.58	4.14	4.99	5.63	5.92	6.52	6.79	6.57	5.99	5.38	4.07	3.44	1918.7	5.3
40.0	3.70	4.20	4.99	5.53	5.73	6.28	6.57	6.45	6.00	5.49	4.21	3.58	1910.4	5.2
45.0	3.80	4.25	4.96	5.40	5.53	6.02	6.33	6.30	5.98	5.57	4.33	3.70	1892.5	5.2
50.0	3.87	4.26	4.90	5.24	5.30	5.73	6.06	6.12	5.91	5.62	4.42	3.79	1864.0	5.1
60.0	3.94	4.22	4.70	4.85	4.76	5.07	5.41	5.65	5.68	5.59	4.52	3.90	1774.2	4.9
70.0	3.90	4.07	4.39	4.35	4.13	4.31	4.66	5.05	5.31	5.42	4.49	3.91	1643.3	4.5
80.0	3.77	3.83	3.99	3.76	3.44	3.53	3.84	4.35	4.81	5.12	4.35	3.82	1478.7	4.1
90.0	3.54	3.50	3.50	3.10	2.74	2.72	3.00	3.55	4.20	4.68	4.09	3.63	1285.1	3.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SCOTTSBLUFF NE  
LATITUDE: 41 DEGREES 52 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.13	3.00	4.12	5.26	6.10	7.05	7.20	6.31	5.04	3.61	2.28	1.81	1642.3	4.5
10.0	2.62	3.43	4.48	5.47	6.18	7.07	7.31	6.61	5.54	4.22	2.84	2.31	1769.7	4.8
15.0	2.85	3.62	4.62	5.53	6.17	7.03	7.30	6.70	5.75	4.49	3.09	2.55	1818.4	5.0
20.0	3.05	3.79	4.74	5.56	6.13	6.95	7.25	6.75	5.91	4.73	3.33	2.76	1856.5	5.1
25.0	3.24	3.94	4.83	5.56	6.05	6.82	7.16	6.76	6.05	4.95	3.55	2.96	1883.5	5.2
30.0	3.41	4.06	4.89	5.53	5.94	6.66	7.02	6.72	6.14	5.13	3.74	3.14	1899.4	5.2
35.0	3.55	4.16	4.92	5.46	5.79	6.46	6.84	6.65	6.20	5.28	3.91	3.30	1904.0	5.2
40.0	3.68	4.23	4.93	5.37	5.61	6.23	6.63	6.54	6.22	5.40	4.05	3.44	1897.2	5.2
45.0	3.78	4.28	4.90	5.25	5.42	5.97	6.39	6.40	6.20	5.48	4.17	3.55	1880.6	5.2
50.0	3.85	4.30	4.85	5.10	5.20	5.70	6.12	6.22	6.14	5.52	4.26	3.65	1853.8	5.1
60.0	3.93	4.26	4.66	4.72	4.68	5.06	5.48	5.75	5.91	5.51	4.35	3.76	1767.5	4.8
70.0	3.90	4.12	4.36	4.25	4.07	4.31	4.73	5.15	5.54	5.35	4.33	3.78	1640.1	4.5
80.0	3.78	3.88	3.96	3.68	3.41	3.55	3.91	4.44	5.03	5.06	4.20	3.69	1478.6	4.1
90.0	3.56	3.55	3.48	3.05	2.73	2.75	3.07	3.64	4.41	4.64	3.96	3.51	1288.3	3.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: CONCORD  
 NH  
 LATITUDE: 43 DEGREES 12 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.45	2.16	3.07	4.16	4.99	5.37	5.28	4.59	3.59	2.57	1.46	1.14	1213.5	3.3
10.0	1.73	2.43	3.30	4.31	5.05	5.39	5.35	4.77	3.89	2.95	1.75	1.40	1289.3	3.5
15.0	1.86	2.55	3.39	4.35	5.05	5.36	5.34	4.82	4.01	3.11	1.88	1.51	1317.1	3.6
20.0	1.98	2.65	3.47	4.37	5.01	5.31	5.31	4.85	4.11	3.26	2.00	1.62	1337.8	3.7
25.0	2.08	2.74	3.52	4.37	4.95	5.22	5.24	4.85	4.19	3.39	2.11	1.71	1351.2	3.7
30.0	2.17	2.81	3.56	4.34	4.87	5.11	5.15	4.82	4.24	3.49	2.20	1.80	1357.2	3.7
35.0	2.25	2.86	3.57	4.29	4.76	4.97	5.03	4.77	4.26	3.58	2.29	1.88	1355.8	3.7
40.0	2.32	2.90	3.57	4.22	4.62	4.81	4.89	4.69	4.27	3.64	2.36	1.94	1346.9	3.7
45.0	2.37	2.93	3.55	4.13	4.47	4.63	4.72	4.59	4.24	3.69	2.41	2.00	1331.3	3.6
50.0	2.41	2.94	3.50	4.01	4.30	4.44	4.54	4.47	4.20	3.71	2.45	2.04	1309.4	3.6
60.0	2.45	2.90	3.36	3.73	3.90	3.98	4.12	4.15	4.04	3.68	2.49	2.09	1244.6	3.4
70.0	2.42	2.80	3.15	3.38	3.43	3.46	3.61	3.75	3.78	3.57	2.46	2.08	1153.5	3.2
80.0	2.34	2.63	2.87	2.96	2.91	2.91	3.06	3.27	3.45	3.37	2.38	2.03	1040.3	2.9
90.0	2.20	2.41	2.54	2.49	2.39	2.35	2.49	2.74	3.04	3.10	2.24	1.92	910.0	2.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LAKEHURST NJ  
LATITUDE: 40 DEGREES 2 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.77	2.51	3.49	4.60	5.27	5.60	5.37	4.83	3.97	3.01	1.96	1.50	1336.4	3.7
10.0	2.08	2.80	3.74	4.75	5.31	5.60	5.41	5.00	4.27	3.42	2.34	1.82	1417.4	3.9
15.0	2.22	2.93	3.83	4.78	5.29	5.55	5.39	5.04	4.39	3.59	2.51	1.96	1446.5	4.0
20.0	2.35	3.04	3.91	4.79	5.24	5.48	5.34	5.05	4.48	3.74	2.67	2.10	1467.7	4.0
25.0	2.47	3.13	3.96	4.78	5.17	5.38	5.26	5.04	4.55	3.88	2.81	2.22	1480.8	4.1
30.0	2.57	3.20	3.99	4.74	5.06	5.25	5.15	5.00	4.59	3.99	2.93	2.33	1485.7	4.1
35.0	2.66	3.26	4.00	4.67	4.93	5.09	5.02	4.93	4.61	4.07	3.04	2.42	1482.4	4.1
40.0	2.73	3.30	3.99	4.58	4.78	4.90	4.86	4.83	4.60	4.13	3.13	2.50	1470.9	4.0
45.0	2.78	3.32	3.95	4.47	4.61	4.71	4.69	4.71	4.56	4.17	3.20	2.57	1452.9	4.0
50.0	2.82	3.32	3.89	4.34	4.42	4.50	4.49	4.57	4.50	4.18	3.25	2.61	1426.8	3.9
60.0	2.84	3.26	3.72	4.00	3.98	4.00	4.04	4.22	4.29	4.13	3.29	2.66	1351.6	3.7
70.0	2.79	3.13	3.46	3.59	3.46	3.43	3.51	3.78	4.00	3.98	3.24	2.65	1247.7	3.4
80.0	2.68	2.93	3.13	3.11	2.91	2.86	2.95	3.27	3.61	3.73	3.12	2.56	1121.0	3.1
90.0	2.51	2.66	2.74	2.58	2.34	2.27	2.36	2.70	3.15	3.40	2.92	2.42	974.4	2.7



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: NEWARK NJ  
LATITUDE: 40 DEGREES 42 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.74	2.50	3.49	4.57	5.32	5.66	5.55	4.93	4.01	2.99	1.88	1.43	1342.9	3.7
10.0	2.06	2.80	3.74	4.72	5.37	5.66	5.61	5.11	4.33	3.41	2.25	1.74	1426.1	3.9
15.0	2.21	2.93	3.84	4.76	5.36	5.62	5.59	5.16	4.46	3.59	2.42	1.88	1456.3	4.0
20.0	2.34	3.04	3.92	4.78	5.31	5.55	5.54	5.17	4.55	3.75	2.57	2.01	1478.4	4.1
25.0	2.46	3.14	3.98	4.76	5.24	5.45	5.46	5.16	4.63	3.89	2.71	2.13	1492.4	4.1
30.0	2.56	3.22	4.01	4.73	5.13	5.32	5.36	5.12	4.67	4.00	2.83	2.24	1498.0	4.1
35.0	2.65	3.28	4.03	4.66	5.00	5.16	5.22	5.06	4.69	4.09	2.94	2.33	1495.4	4.1
40.0	2.73	3.32	4.02	4.57	4.85	4.98	5.06	4.96	4.69	4.16	3.03	2.41	1484.4	4.1
45.0	2.78	3.34	3.98	4.47	4.68	4.79	4.88	4.85	4.65	4.20	3.10	2.47	1466.6	4.0
50.0	2.82	3.34	3.93	4.33	4.49	4.57	4.68	4.70	4.59	4.21	3.15	2.52	1440.9	3.9
60.0	2.85	3.29	3.76	4.01	4.05	4.07	4.21	4.34	4.39	4.17	3.19	2.57	1366.2	3.7
70.0	2.81	3.16	3.50	3.60	3.53	3.50	3.66	3.90	4.10	4.02	3.15	2.55	1262.1	3.5
80.0	2.70	2.97	3.18	3.12	2.97	2.92	3.07	3.37	3.71	3.78	3.03	2.48	1134.7	3.1
90.0	2.53	2.70	2.79	2.60	2.39	2.32	2.47	2.79	3.25	3.45	2.84	2.34	987.1	2.7

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ALBUQUERQUE NM  
LATITUDE: 35 DEGREES 3 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.20	4.23	5.57	7.03	8.00	8.44	7.84	7.22	6.21	4.88	3.57	2.93	2104.8	5.8
10.0	3.82	4.78	6.00	7.25	8.01	8.37	7.85	7.45	6.73	5.59	4.33	3.62	2246.8	6.2
15.0	4.10	5.01	6.16	7.24	7.95	8.25	7.78	7.50	6.92	5.90	4.67	3.93	2297.4	6.3
20.0	4.35	5.21	6.28	7.29	7.83	8.09	7.67	7.51	7.07	6.17	4.98	4.22	2334.0	6.4
25.0	4.58	5.38	6.37	7.25	7.67	7.87	7.51	7.46	7.18	6.40	5.25	4.49	2356.2	6.5
30.0	4.77	5.52	6.42	7.16	7.46	7.61	7.31	7.37	7.24	6.58	5.50	4.72	2363.8	6.5
35.0	4.94	5.62	6.43	7.03	7.21	7.30	7.06	7.24	7.26	6.73	5.70	4.92	2356.9	6.5
40.0	5.07	5.69	6.40	6.87	6.94	6.98	6.79	7.07	7.23	6.83	5.87	5.09	2338.0	6.4
45.0	5.17	5.72	6.33	6.66	6.63	6.62	6.49	6.86	7.16	6.89	6.00	5.23	2304.8	6.3
50.0	5.24	5.74	6.22	6.42	6.28	6.22	6.14	6.60	7.04	6.90	6.09	5.33	2257.4	6.2
60.0	5.27	5.61	5.89	5.82	5.47	5.33	5.36	5.98	6.66	6.79	6.15	5.43	2121.6	5.8
70.0	5.17	5.35	5.42	5.09	4.55	4.36	4.46	5.22	6.13	6.50	6.05	5.38	1936.3	5.3
80.0	4.93	4.97	4.83	4.25	3.63	3.37	3.56	4.35	5.44	6.05	5.78	5.19	1712.9	4.7
90.0	4.57	4.46	4.13	3.35	2.67	2.42	2.63	3.42	4.63	5.44	5.36	4.86	1456.8	4.0

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CLAYTON NM  
LATITUDE: 36 DEGREES 27 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.03	3.91	5.20	6.43	7.00	7.62	7.20	6.61	5.68	4.52	3.24	2.72	1923.3	5.3
10.0	3.65	4.43	5.62	6.64	7.03	7.58	7.22	6.84	6.15	5.19	3.94	3.39	2060.2	5.6
15.0	3.92	4.65	5.77	6.68	6.98	7.49	7.17	6.89	6.34	5.48	4.26	3.69	2110.4	5.8
20.0	4.18	4.84	5.90	6.69	6.89	7.35	7.08	6.90	6.48	5.74	4.55	3.98	2148.0	5.9
25.0	4.40	5.00	5.98	6.66	6.77	7.18	6.95	6.86	6.58	5.96	4.81	4.23	2172.6	6.0
30.0	4.60	5.13	6.03	6.59	6.60	6.96	6.78	6.79	6.64	6.14	5.04	4.46	2184.0	6.0
35.0	4.77	5.23	6.05	6.48	6.39	6.70	6.56	6.68	6.66	6.28	5.23	4.66	2182.1	6.0
40.0	4.91	5.30	6.03	6.33	6.17	6.42	6.33	6.53	6.64	6.38	5.40	4.83	2168.8	5.9
45.0	5.02	5.34	5.97	6.16	5.91	6.12	6.06	6.35	6.58	6.44	5.52	4.97	2142.9	5.9
50.0	5.09	5.34	5.87	5.94	5.62	5.78	5.76	6.13	6.48	6.46	5.61	5.08	2104.2	5.8
60.0	5.14	5.24	5.58	5.42	4.96	5.01	5.07	5.58	6.15	6.37	5.68	5.18	1989.1	5.4
70.0	5.06	5.02	5.16	4.77	4.19	4.16	4.27	4.91	5.68	6.12	5.60	5.15	1827.8	5.0
80.0	4.84	4.67	4.61	4.03	3.41	3.31	3.47	4.13	5.07	5.71	5.37	4.99	1630.3	4.5
90.0	4.50	4.22	3.97	3.22	2.59	2.46	2.61	3.30	4.35	5.16	5.00	4.69	1400.3	3.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: FARMINGTON NM  
LATITUDE: 36 DEGREES 45 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.98	4.04	5.33	6.73	7.73	8.41	7.81	7.10	6.09	4.66	3.30	2.64	2034.4	5.6
10.0	3.59	4.59	5.77	6.96	7.77	8.36	7.85	7.36	6.64	5.38	4.04	3.29	2179.5	6.0
15.0	3.87	4.83	5.93	7.01	7.72	8.26	7.80	7.42	6.85	5.69	4.37	3.59	2232.5	6.1
20.0	4.12	5.03	6.07	7.03	7.62	8.12	7.70	7.44	7.01	5.96	4.67	3.87	2271.8	6.2
25.0	4.34	5.21	6.16	7.00	7.48	7.92	7.55	7.41	7.14	6.20	4.95	4.12	2297.1	6.3
30.0	4.54	5.35	6.22	6.92	7.29	7.67	7.36	7.34	7.22	6.40	5.19	4.34	2308.3	6.3
35.0	4.71	5.47	6.24	6.81	7.07	7.38	7.13	7.22	7.25	6.55	5.40	4.54	2305.2	6.3
40.0	4.85	5.54	6.22	6.66	6.81	7.07	6.87	7.06	7.23	6.67	5.57	4.70	2289.8	6.3
45.0	4.96	5.58	6.16	6.48	6.52	6.72	6.58	6.86	7.17	6.74	5.71	4.84	2261.1	6.2
50.0	5.03	5.59	6.07	6.26	6.20	6.34	6.25	6.63	7.07	6.76	5.80	4.94	2218.7	6.1
60.0	5.08	5.50	5.77	5.70	5.45	5.47	5.48	6.03	6.73	6.68	5.88	5.05	2093.5	5.7
70.0	5.00	5.27	5.34	5.02	4.58	4.51	4.60	5.30	6.22	6.42	5.80	5.02	1918.7	5.3
80.0	4.79	4.91	4.78	4.24	3.70	3.54	3.71	4.46	5.55	6.00	5.57	4.86	1705.8	4.7
90.0	4.46	4.44	4.11	3.38	2.77	2.58	2.76	3.54	4.76	5.42	5.19	4.57	1458.2	4.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ROSWELL NM  
 LATITUDE: 33 DEGREES 24 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.29	4.33	5.69	7.00	7.75	8.23	7.69	7.07	6.03	4.81	3.56	3.00	2084.6	5.7
10.0	3.88	4.86	6.10	7.18	7.73	8.13	7.67	7.26	6.48	5.45	4.25	3.65	2211.6	6.1
15.0	4.14	5.08	6.25	7.21	7.66	8.00	7.59	7.29	6.64	5.73	4.55	3.94	2255.3	6.2
20.0	4.38	5.27	6.37	7.20	7.53	7.83	7.47	7.28	6.77	5.96	4.82	4.21	2285.3	6.3
25.0	4.59	5.43	6.44	7.14	7.36	7.61	7.30	7.22	6.85	6.16	5.07	4.45	2301.3	6.3
30.0	4.77	5.55	6.48	7.05	7.15	7.34	7.09	7.12	6.89	6.32	5.28	4.66	2303.3	6.3
35.0	4.92	5.64	6.47	6.91	6.90	7.04	6.84	6.98	6.89	6.44	5.46	4.84	2292.0	6.3
40.0	5.04	5.69	6.43	6.73	6.63	6.72	6.57	6.80	6.84	6.52	5.60	4.99	2268.5	6.2
45.0	5.13	5.71	6.35	6.51	6.32	6.35	6.26	6.58	6.75	6.55	5.71	5.11	2231.1	6.1
50.0	5.18	5.70	6.23	6.26	5.97	5.96	5.91	6.32	6.62	6.55	5.77	5.20	2180.2	6.0
60.0	5.19	5.56	5.87	5.65	5.18	5.07	5.13	5.70	6.24	6.41	5.80	5.26	2039.5	5.6
70.0	5.06	5.29	5.38	4.91	4.29	4.13	4.25	4.95	5.71	6.11	5.67	5.19	1853.3	5.1
80.0	4.81	4.89	4.77	4.07	3.40	3.17	3.36	4.10	5.05	5.65	5.39	4.99	1630.3	4.5
90.0	4.43	4.37	4.04	3.18	2.50	2.27	2.47	3.20	4.27	5.06	4.98	4.65	1379.9	3.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: TRUTH OR CONSEQUENNM  
LATITUDE: 33 DEGREES 14 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.52	4.58	5.94	7.37	8.07	8.36	7.45	6.99	6.11	4.98	3.83	3.16	2141.8	5.9
10.0	4.18	5.15	6.38	7.57	8.05	8.25	7.43	7.17	6.56	5.65	4.59	3.86	2278.2	6.2
15.0	4.47	5.39	6.54	7.60	7.96	8.12	7.36	7.20	6.73	5.94	4.93	4.18	2325.8	6.4
20.0	4.73	5.60	6.67	7.59	7.83	7.94	7.23	7.19	6.86	6.18	5.24	4.47	2359.2	6.5
25.0	4.97	5.77	6.75	7.53	7.65	7.71	7.07	7.13	6.94	6.39	5.52	4.73	2378.0	6.5
30.0	5.17	5.91	6.79	7.42	7.43	7.44	6.87	7.03	6.98	6.56	5.75	4.96	2382.2	6.5
35.0	5.34	6.01	6.78	7.28	7.17	7.13	6.63	6.89	6.98	6.68	5.95	5.16	2372.6	6.5
.0	5.47	6.07	6.74	7.09	6.88	6.80	6.37	6.71	6.93	6.77	6.11	5.33	2350.0	6.4
45.0	5.57	6.10	6.65	6.86	6.55	6.43	6.07	6.50	6.84	6.81	6.24	5.45	2313.0	6.3
50.0	5.63	6.09	6.53	6.59	6.18	6.02	5.73	6.24	6.71	6.80	6.32	5.55	2261.9	6.2
60.0	5.65	5.94	6.16	5.93	5.35	5.11	4.98	5.62	6.32	6.66	6.35	5.62	2118.7	5.8
70.0	5.52	5.65	5.64	5.14	4.41	4.15	4.13	4.88	5.78	6.35	6.21	5.55	1927.8	5.3
80.0	5.24	5.22	4.98	4.24	3.47	3.17	3.28	4.04	5.10	5.87	5.91	5.33	1697.7	4.7
90.0	4.83	4.67	4.22	3.30	2.52	2.25	2.42	3.15	4.31	5.25	5.46	4.97	1438.6	3.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJH/SQ. M)

SITE: TUCUMCARI NM  
LATITUDE: 35 DEGREES 11 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.17	4.09	5.39	6.62	7.30	7.83	7.40	6.83	5.77	4.55	3.38	2.87	1985.2	5.4
10.0	3.79	4.61	5.80	6.82	7.31	7.76	7.41	7.04	6.22	5.19	4.07	3.55	2118.2	5.8
15.0	4.07	4.83	5.96	6.86	7.25	7.66	7.35	7.08	6.40	5.46	4.38	3.85	2165.9	5.9
20.0	4.32	5.02	6.07	6.86	7.15	7.51	7.24	7.09	6.53	5.70	4.67	4.14	2200.5	6.0
25.0	4.55	5.18	6.16	6.82	7.00	7.32	7.10	7.04	6.62	5.90	4.92	4.39	2221.8	6.1
30.0	4.74	5.31	6.20	6.74	6.82	7.08	6.91	6.96	6.67	6.07	5.14	4.62	2229.6	6.1
35.0	4.91	5.41	6.21	6.62	6.60	6.81	6.68	6.83	6.68	6.20	5.33	4.82	2223.8	6.1
40.0	5.04	5.47	6.18	6.46	6.35	6.52	6.43	6.67	6.65	6.28	5.49	4.98	2206.8	6.0
45.0	5.14	5.50	6.11	6.27	6.08	6.19	6.15	6.47	6.58	6.33	5.61	5.12	2176.6	6.0
50.0	5.21	5.49	6.01	6.04	5.76	5.83	5.83	6.24	6.47	6.34	5.69	5.22	2133.2	5.8
60.0	5.24	5.38	5.69	5.49	5.05	5.02	5.10	5.66	6.12	6.23	5.74	5.31	2008.3	5.5
70.0	5.14	5.14	5.24	4.81	4.23	4.14	4.26	4.95	5.63	5.96	5.64	5.26	1837.2	5.0
80.0	4.91	4.77	4.67	4.03	3.41	3.25	3.43	4.14	5.01	5.54	5.39	5.08	1630.3	4.5
90.0	4.55	4.29	3.99	3.20	2.56	2.39	2.56	3.27	4.27	4.99	5.00	4.76	1392.5	3.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ZUNI NM  
LATITUDE: 35 DEGREES 6 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.10	4.09	5.32	6.83	7.80	8.20	7.14	6.55	5.97	4.71	3.43	2.82	2008.2	5.5
10.0	3.70	4.61	5.72	7.04	7.81	8.13	7.14	6.75	6.45	5.39	4.14	3.47	2141.2	5.9
15.0	3.96	4.83	5.87	7.08	7.74	8.02	7.09	6.79	6.64	5.68	4.46	3.77	2188.5	6.0
20.0	4.20	5.02	5.98	7.08	7.63	7.86	6.98	6.79	6.78	5.93	4.75	4.04	2222.7	6.1
25.0	4.42	5.18	6.06	7.04	7.48	7.65	6.84	6.74	6.88	6.15	5.00	4.28	2243.3	6.1
30.0	4.60	5.30	6.10	6.96	7.28	7.40	6.66	6.66	6.93	6.32	5.23	4.50	2250.2	6.2
35.0	4.76	5.40	6.11	6.83	7.03	7.11	6.44	6.54	6.94	6.46	5.42	4.69	2243.4	6.1
40.0	4.89	5.46	6.08	6.67	6.77	6.80	6.20	6.39	6.91	6.55	5.58	4.85	2225.5	6.1
45.0	4.98	5.49	6.01	6.47	6.47	6.46	5.93	6.20	6.84	6.60	5.70	4.98	2194.0	6.0
50.0	5.05	5.49	5.90	6.23	6.13	6.07	5.63	5.97	6.72	6.61	5.79	5.07	2149.3	5.9
60.0	5.07	5.37	5.59	5.66	5.35	5.21	4.93	5.42	6.37	6.50	5.84	5.16	2021.4	5.5
70.0	4.97	5.13	5.15	4.95	4.46	4.28	4.13	4.75	5.85	6.22	5.73	5.11	1846.9	5.1
80.0	4.74	4.76	4.59	4.14	3.57	3.33	3.34	3.98	5.20	5.79	5.48	4.93	1636.6	4.5
90.0	4.39	4.28	3.92	3.28	2.64	2.42	2.50	3.15	4.43	5.21	5.08	4.62	1395.6	3.8



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ELKO NV  
LATITUDE: 40 DEGREES 50 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.18	3.26	4.61	5.99	7.26	7.98	8.27	7.30	5.97	4.17	2.56	1.95	1873.7	5.1
10.0	2.65	3.74	5.03	6.24	7.36	8.00	8.39	7.66	6.61	4.91	3.19	2.47	2018.4	5.5
15.0	2.86	3.95	5.19	6.31	7.34	7.94	8.38	7.77	6.87	5.23	3.48	2.71	2072.9	5.7
20.0	3.06	4.13	5.33	6.34	7.28	7.84	8.31	7.83	7.09	5.52	3.75	2.94	2114.8	5.8
25.0	3.23	4.29	5.43	6.34	7.18	7.69	8.19	7.84	7.26	5.78	3.99	3.14	2143.7	5.9
30.0	3.39	4.42	5.50	6.30	7.04	7.49	8.03	7.80	7.39	6.00	4.21	3.33	2159.5	5.9
35.0	3.53	4.53	5.54	6.23	6.86	7.25	7.81	7.72	7.47	6.18	4.39	3.49	2162.0	5.9
40.0	3.64	4.61	5.55	6.11	6.63	6.97	7.55	7.58	7.50	6.32	4.55	3.63	2151.2	5.9
45.0	3.73	4.66	5.52	5.97	6.39	6.67	7.26	7.41	7.48	6.42	4.68	3.75	2129.6	5.8
50.0	3.80	4.68	5.46	5.80	6.11	6.34	6.93	7.19	7.41	6.47	4.78	3.85	2095.5	5.7
60.0	3.86	4.64	5.24	5.35	5.46	5.58	6.16	6.63	7.13	6.46	4.89	3.96	1989.2	5.4
70.0	3.83	4.48	4.89	4.79	4.69	4.70	5.25	5.90	6.67	6.27	4.86	3.97	1835.0	5.0
80.0	3.69	4.21	4.44	4.12	3.87	3.81	4.27	5.04	6.04	5.92	4.71	3.87	1642.5	4.5
90.0	3.47	3.85	3.88	3.38	3.02	2.87	3.27	4.07	5.26	5.42	4.43	3.67	1416.3	3.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ELY NV  
 LATITUDE: 39 DEGREES 17 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.59	3.60	5.04	6.34	7.28	7.93	7.72	7.04	6.10	4.43	2.92	2.28	1927.6	5.3
10.0	3.16	4.12	5.52	6.59	7.36	7.92	7.80	7.34	6.72	5.19	3.63	2.89	2078.1	5.7
15.0	3.42	4.34	5.69	6.66	7.33	7.85	7.77	7.42	6.97	5.52	3.95	3.17	2134.8	5.8
20.0	3.66	4.54	5.84	6.69	7.26	7.74	7.69	7.46	7.17	5.82	4.25	3.43	2178.5	6.0
25.0	3.87	4.71	5.95	6.68	7.15	7.58	7.57	7.46	7.33	6.08	4.52	3.67	2208.8	6.1
30.0	4.06	4.86	6.02	6.62	6.99	7.37	7.41	7.40	7.44	6.30	4.76	3.88	2225.6	6.1
35.0	4.23	4.97	6.06	6.53	6.80	7.12	7.19	7.31	7.50	6.47	4.97	4.07	2228.7	6.1
40.0	4.36	5.05	6.05	6.41	6.57	6.83	6.94	7.17	7.52	6.61	5.14	4.23	2218.4	6.1
45.0	4.47	5.10	6.02	6.25	6.32	6.53	6.67	6.99	7.48	6.70	5.29	4.37	2196.9	6.0
50.0	4.55	5.12	5.94	6.05	6.03	6.19	6.36	6.77	7.40	6.75	5.39	4.47	2161.8	5.9
60.0	4.62	5.06	5.69	5.56	5.36	5.42	5.64	6.21	7.09	6.71	5.50	4.60	2052.5	5.6
70.0	4.58	4.87	5.29	4.95	4.58	4.53	4.80	5.51	6.60	6.50	5.46	4.60	1893.8	5.2
80.0	4.41	4.57	4.78	4.23	3.75	3.65	3.91	4.68	5.95	6.11	5.27	4.47	1696.2	4.6
90.0	4.13	4.16	4.15	3.42	2.89	2.74	2.98	3.76	5.14	5.57	4.94	4.23	1463.0	4.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LAS VEGAS NV  
 LATITUDE: 36 DEGREES 5 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.08	4.22	5.75	7.31	8.34	8.76	8.16	7.42	6.42	4.85	3.42	2.78	2147.3	5.9
10.0	3.70	4.80	6.23	7.57	8.38	8.70	8.19	7.69	7.00	5.61	4.17	3.46	2298.2	6.3
15.0	3.98	5.04	6.41	7.63	8.32	8.59	8.13	7.75	7.22	5.93	4.51	3.77	2352.5	6.4
20.0	4.23	5.26	6.55	7.64	8.21	8.43	8.02	7.77	7.40	6.21	4.82	4.05	2392.3	6.6
25.0	4.46	5.44	6.66	7.61	8.05	8.21	7.86	7.73	7.53	6.46	5.09	4.31	2417.1	6.6
30.0	4.66	5.59	6.72	7.53	7.84	7.95	7.66	7.65	7.61	6.66	5.34	4.54	2426.9	6.6
35.0	4.83	5.70	6.74	7.40	7.58	7.63	7.41	7.52	7.64	6.82	5.55	4.75	2421.4	6.6
40.0	4.97	5.78	6.72	7.23	7.29	7.30	7.13	7.35	7.62	6.94	5.72	4.92	2403.2	6.6
45.0	5.07	5.82	6.66	7.03	6.97	6.93	6.81	7.14	7.56	7.01	5.85	5.06	2370.6	6.5
50.0	5.15	5.83	6.56	6.78	6.61	6.52	6.46	6.88	7.44	7.03	5.95	5.16	2323.2	6.4
60.0	5.19	5.73	6.23	6.16	5.77	5.59	5.64	6.25	7.07	6.94	6.02	5.27	2185.8	6.0
70.0	5.11	5.49	5.75	5.40	4.81	4.57	4.70	5.47	6.52	6.67	5.93	5.23	1996.1	5.5
80.0	4.88	5.11	5.14	4.52	3.83	3.54	3.75	4.57	5.81	6.22	5.69	5.06	1766.7	4.8
90.0	4.54	4.60	4.40	3.57	2.80	2.54	2.76	3.60	4.96	5.61	5.29	4.75	1501.5	4.1

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LOVELOCK NV  
LATITUDE: 40 DEGREES 4 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.54	3.67	5.22	6.83	8.05	8.67	8.78	7.83	6.39	4.57	2.93	2.25	2064.3	5.7
10.0	3.12	4.23	5.72	7.13	8.16	8.68	8.90	8.21	7.07	5.41	3.69	2.89	2230.7	6.1
15.0	3.39	4.48	5.91	7.22	8.14	8.61	8.88	8.33	7.35	5.78	4.03	3.18	2293.6	6.3
20.0	3.63	4.69	6.08	7.26	8.07	8.49	8.80	8.39	7.58	6.11	4.35	3.45	2342.3	6.4
25.0	3.85	4.88	6.20	7.26	7.95	8.32	8.67	8.40	7.76	6.40	4.64	3.70	2376.2	6.5
30.0	4.05	5.04	6.29	7.22	7.79	8.09	8.49	8.35	7.88	6.65	4.89	3.92	2395.2	6.6
35.0	4.22	5.16	6.33	7.13	7.57	7.82	8.25	8.25	7.96	6.86	5.12	4.12	2399.2	6.6
40.0	4.37	5.26	6.34	7.00	7.31	7.50	7.96	8.10	7.99	7.02	5.31	4.29	2388.0	6.5
45.0	4.48	5.32	6.31	6.83	7.03	7.17	7.65	7.91	7.96	7.13	5.47	4.43	2365.1	6.5
50.0	4.57	5.35	6.24	6.62	6.71	6.79	7.29	7.67	7.88	7.19	5.59	4.55	2327.4	6.4
60.0	4.65	5.30	5.99	6.10	5.96	5.93	6.45	7.05	7.57	7.18	5.71	4.69	2208.7	6.1
70.0	4.61	5.12	5.59	5.43	5.08	4.94	5.47	6.25	7.07	6.97	5.68	4.70	2035.5	5.6
80.0	4.45	4.81	5.06	4.64	4.14	3.95	4.42	5.31	6.38	6.57	5.50	4.58	1819.3	5.0
90.0	4.18	4.38	4.40	3.75	3.16	2.91	3.34	4.25	5.54	6.00	5.17	4.34	1564.2	4.3

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: RENO NV  
 LATITUDE: 39 DEGREES 30 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.53	3.62	5.19	6.31	7.96	8.51	8.48	7.59	6.29	4.51	2.88	2.23	2029.2	5.6
10.0	3.08	4.16	5.67	7.09	8.05	8.52	8.59	7.94	6.95	5.30	3.58	2.82	2186.0	6.0
15.0	3.34	4.39	5.86	7.18	8.03	8.44	8.56	8.05	7.21	5.65	3.90	3.10	2244.5	6.1
20.0	3.57	4.59	6.02	7.21	7.95	8.32	8.48	8.10	7.43	5.96	4.20	3.35	2289.2	6.3
25.0	3.78	4.77	6.14	7.21	7.83	8.14	8.35	8.10	7.60	6.23	4.46	3.58	2319.6	6.4
30.0	3.96	4.91	6.22	7.16	7.66	7.92	8.16	8.05	7.71	6.46	4.70	3.79	2335.6	6.4
35.0	4.12	5.03	6.26	7.06	7.44	7.65	7.93	7.95	7.78	6.65	4.91	3.98	2336.9	6.4
40.0	4.26	5.11	6.26	6.93	7.19	7.33	7.64	7.80	7.80	6.79	5.08	4.14	2323.9	6.4
45.0	4.36	5.17	6.22	6.76	6.91	7.00	7.34	7.61	7.77	6.89	5.23	4.27	2299.3	6.3
50.0	4.44	5.19	6.15	6.55	6.59	6.63	7.00	7.37	7.69	6.95	5.33	4.37	2260.4	6.2
60.0	4.51	5.13	5.89	6.02	5.85	5.79	6.18	6.76	7.37	6.92	5.44	4.49	2140.8	5.9
70.0	4.47	4.95	5.49	5.35	4.97	4.81	5.23	5.99	6.87	6.70	5.40	4.49	1968.8	5.4
80.0	4.30	4.64	4.96	4.56	4.04	3.85	4.22	5.08	6.19	6.31	5.22	4.37	1756.2	4.8
90.0	4.03	4.22	4.31	3.68	3.09	2.84	3.17	4.05	5.36	5.75	4.90	4.14	1506.4	4.1

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: TONOPAH NV  
 LATITUDE: 38 DEGREES 4 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.90	4.02	5.60	7.10	8.13	8.78	8.53	7.69	6.44	4.79	3.25	2.61	2127.1	5.8
10.0	3.53	4.60	6.11	7.38	8.20	8.76	8.60	8.02	7.08	5.60	4.04	3.31	2291.1	6.3
15.0	3.82	4.86	6.31	7.45	8.16	8.67	8.56	8.11	7.33	5.96	4.39	3.63	2352.2	6.4
20.0	4.08	5.08	6.47	7.48	8.07	8.53	8.47	8.15	7.53	6.28	4.72	3.93	2398.5	6.6
25.0	4.32	5.27	6.59	7.46	7.93	8.33	8.32	8.13	7.68	6.55	5.01	4.21	2429.8	6.7
30.0	4.53	5.43	6.67	7.40	7.75	8.08	8.12	8.07	7.79	6.78	5.28	4.45	2445.8	6.7
35.0	4.71	5.56	6.70	7.29	7.51	7.79	7.87	7.95	7.84	6.97	5.50	4.67	2446.4	6.7
40.0	4.86	5.65	6.70	7.14	7.24	7.45	7.58	7.79	7.85	7.11	5.69	4.85	2432.8	6.7
45.0	4.98	5.70	6.65	6.96	6.95	7.10	7.26	7.59	7.80	7.21	5.85	5.01	2405.9	6.6
50.0	5.07	5.72	6.57	6.73	6.61	6.70	6.91	7.33	7.70	7.25	5.96	5.13	2363.9	6.5
60.0	5.14	5.65	6.27	6.15	5.83	5.80	6.07	6.70	7.36	7.20	6.07	5.26	2235.9	6.1
70.0	5.08	5.43	5.82	5.44	4.91	4.78	5.09	5.90	6.83	6.96	6.01	5.25	2053.2	5.6
80.0	4.88	5.08	5.23	4.60	3.96	3.76	4.08	4.97	6.12	6.53	5.79	5.11	1828.3	5.0
90.0	4.56	4.61	4.52	3.67	2.97	2.73	3.02	3.93	5.27	5.93	5.42	4.82	1564.4	4.3

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: WINNEMUCCA NV  
LATITUDE: 40 DEGREES 54 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.18	3.24	4.64	6.21	7.45	8.10	8.45	7.40	6.01	4.16	2.56	1.95	1900.0	5.2
10.0	2.65	3.71	5.06	6.47	7.55	8.12	8.58	7.78	6.67	4.91	3.19	2.48	2046.8	5.6
15.0	2.87	3.92	5.23	6.55	7.54	8.06	8.57	7.89	6.93	5.23	3.48	2.72	2102.0	5.8
20.0	3.07	4.10	5.37	6.59	7.48	7.96	8.50	7.95	7.15	5.53	3.74	2.95	2144.4	5.9
25.0	3.24	4.26	5.47	6.59	7.38	7.81	8.38	7.97	7.33	5.78	3.98	3.16	2173.5	6.0
30.0	3.40	4.39	5.55	6.55	7.23	7.61	8.21	7.93	7.46	6.00	4.20	3.35	2189.3	6.0
35.0	3.54	4.50	5.58	6.48	7.04	7.36	7.99	7.85	7.54	6.19	4.39	3.51	2191.5	6.0
40.0	3.66	4.57	5.59	6.36	6.81	7.08	7.72	7.71	7.57	6.33	4.55	3.66	2180.2	6.0
45.0	3.75	4.62	5.56	6.21	6.56	6.77	7.42	7.54	7.55	6.43	4.68	3.78	2158.0	5.9
50.0	3.82	4.64	5.50	6.03	6.28	6.44	7.09	7.31	7.48	6.48	4.78	3.87	2123.0	5.8
60.0	3.88	4.60	5.28	5.57	5.60	5.66	6.30	6.74	7.20	6.47	4.88	3.99	2014.3	5.5
70.0	3.85	4.45	4.94	4.98	4.81	4.76	5.36	6.00	6.74	6.28	4.86	3.99	1856.9	5.1
80.0	3.71	4.18	4.48	4.28	3.96	3.86	4.35	5.12	6.10	5.93	4.70	3.90	1660.5	4.5
90.0	3.49	3.82	3.92	3.50	3.08	2.90	3.32	4.13	5.31	5.43	4.43	3.70	1430.1	3.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: YUCCA FLATS NV  
LATITUDE: 36 DEGREES 57 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	3.00	4.01	5.56	7.09	8.12	8.62	8.36	7.51	6.38	4.77	3.28	2.69	2114.0	5.8
10.0	3.63	4.57	6.03	7.35	8.17	8.58	8.41	7.80	6.97	5.54	4.02	3.38	2267.4	6.2
15.0	3.92	4.80	6.21	7.41	8.12	8.48	8.36	7.88	7.20	5.87	4.36	3.69	2323.4	6.4
20.0	4.17	5.01	6.36	7.43	8.02	8.33	8.26	7.90	7.39	6.16	4.66	3.98	2365.0	6.5
25.0	4.41	5.19	6.46	7.40	7.87	8.12	8.10	7.88	7.53	6.41	4.94	4.24	2391.8	6.6
30.0	4.61	5.33	6.53	7.33	7.68	7.87	7.90	7.80	7.62	6.63	5.18	4.48	2403.7	6.6
35.0	4.79	5.44	6.55	7.21	7.44	7.57	7.64	7.68	7.66	6.79	5.39	4.69	2400.5	6.6
40.0	4.93	5.52	6.54	7.06	7.17	7.25	7.36	7.51	7.65	6.92	5.57	4.86	2384.2	6.5
45.0	5.04	5.56	6.48	6.86	6.86	6.89	7.04	7.31	7.59	6.99	5.70	5.01	2354.2	6.4
50.0	5.12	5.57	6.39	6.63	6.52	6.50	6.68	7.05	7.49	7.03	5.80	5.12	2309.6	6.3
60.0	5.18	5.48	6.08	6.04	5.72	5.60	5.85	6.42	7.13	6.95	5.89	5.23	2177.7	6.0
70.0	5.10	5.26	5.63	5.32	4.80	4.60	4.88	5.63	6.60	6.69	5.81	5.21	1993.5	5.5
80.0	4.89	4.90	5.04	4.48	3.85	3.61	3.90	4.72	5.89	6.26	5.58	5.05	1769.2	4.8
90.0	4.56	4.43	4.34	3.56	2.86	2.61	2.87	3.73	5.05	5.66	5.20	4.76	1508.2	4.1



AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ALBANY NY  
LATITUDE: 42 DEGREES 45 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.44	2.17	3.10	4.21	4.94	5.46	5.44	4.73	3.69	2.57	1.44	1.12	1228.4	3.4
10.0	1.71	2.43	3.34	4.36	5.01	5.47	5.51	4.92	4.00	2.94	1.71	1.35	1302.2	3.6
15.0	1.83	2.55	3.43	4.40	5.00	5.44	5.50	4.97	4.12	3.10	1.84	1.46	1328.9	3.6
20.0	1.94	2.65	3.50	4.42	4.96	5.38	5.46	5.00	4.22	3.24	1.95	1.56	1348.4	3.7
25.0	2.03	2.73	3.56	4.42	4.90	5.29	5.40	4.99	4.29	3.36	2.05	1.64	1360.5	3.7
30.0	2.12	2.80	3.59	4.39	4.82	5.18	5.30	4.97	4.34	3.46	2.14	1.72	1365.3	3.7
35.0	2.20	2.86	3.60	4.34	4.71	5.04	5.18	4.91	4.37	3.55	2.21	1.79	1362.5	3.7
40.0	2.26	2.89	3.60	4.26	4.57	4.87	5.02	4.83	4.37	3.61	2.28	1.85	1352.3	3.7
45.0	2.31	2.92	3.58	4.17	4.42	4.68	4.85	4.72	4.35	3.65	2.33	1.90	1335.4	3.7
50.0	2.34	2.92	3.53	4.05	4.25	4.48	4.66	4.59	4.30	3.67	2.36	1.94	1312.2	3.6
60.0	2.37	2.88	3.39	3.76	3.85	4.02	4.22	4.26	4.13	3.64	2.39	1.97	1244.7	3.4
70.0	2.34	2.78	3.17	3.40	3.39	3.49	3.69	3.84	3.87	3.52	2.36	1.96	1151.0	3.2
80.0	2.26	2.61	2.89	2.97	2.87	2.93	3.12	3.35	3.52	3.32	2.28	1.91	1035.6	2.8
90.0	2.12	2.39	2.55	2.50	2.35	2.35	2.53	2.80	3.10	3.05	2.14	1.80	903.2	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BINGHAMTON  
NY  
LATITUDE: 42 DEGREES 13 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.22	1.82	2.71	3.92	4.71	5.30	5.23	4.49	3.56	2.46	1.31	0.94	1147.8	3.1
10.0	1.48	1.99	2.89	4.04	4.77	5.31	5.29	4.66	3.84	2.78	1.52	1.16	1210.9	3.3
15.0	1.60	2.06	2.95	4.08	4.75	5.28	5.28	4.70	3.95	2.93	1.61	1.26	1233.1	3.4
20.0	1.70	2.13	3.00	4.09	4.72	5.22	5.24	4.72	4.04	3.05	1.70	1.36	1248.7	3.4
25.0	1.80	2.18	3.04	4.08	4.66	5.14	5.17	4.72	4.11	3.16	1.77	1.44	1257.6	3.4
30.0	1.89	2.22	3.06	4.05	4.58	5.02	5.08	4.69	4.15	3.25	1.84	1.52	1259.7	3.5
35.0	1.97	2.25	3.06	4.00	4.47	4.88	4.96	4.63	4.18	3.32	1.89	1.59	1255.1	3.4
40.0	2.03	2.26	3.05	3.93	4.34	4.72	4.81	4.55	4.17	3.37	1.94	1.65	1243.7	3.4
45.0	2.08	2.27	3.02	3.84	4.19	4.54	4.65	4.45	4.15	3.40	1.97	1.70	1226.4	3.4
50.0	2.12	2.26	2.98	3.73	4.03	4.34	4.46	4.32	4.10	3.42	2.00	1.73	1203.3	3.3
60.0	2.15	2.22	2.85	3.46	3.66	3.89	4.04	4.01	3.93	3.38	2.01	1.78	1138.2	3.1
70.0	2.14	2.12	2.66	3.13	3.21	3.37	3.53	3.61	3.67	3.26	1.97	1.78	1049.8	2.9
80.0	2.06	1.99	2.42	2.74	2.73	2.84	2.98	3.15	3.34	3.07	1.90	1.73	942.4	2.6
90.0	1.94	1.81	2.13	2.30	2.24	2.28	2.42	2.63	2.94	2.81	1.77	1.64	819.9	2.2

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: BUFFALO NY  
 LATITUDE: 42 DEGREES 56 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.10	1.72	2.30	4.14	5.03	5.69	5.60	4.77	3.63	2.47	1.27	0.89	1193.1	3.3
10.0	1.33	1.96	2.99	4.29	5.10	5.71	5.68	4.96	3.93	2.81	1.49	1.11	1261.3	3.5
15.0	1.43	2.07	3.07	4.33	5.09	5.68	5.67	5.02	4.05	2.96	1.58	1.21	1285.4	3.5
20.0	1.53	2.16	3.12	4.35	5.06	5.62	5.64	5.05	4.15	3.10	1.67	1.30	1302.7	3.6
25.0	1.61	2.24	3.17	4.35	5.00	5.53	5.57	5.05	4.23	3.21	1.75	1.39	1312.8	3.6
30.0	1.69	2.30	3.19	4.32	4.91	5.41	5.47	5.02	4.28	3.31	1.82	1.46	1315.7	3.6
35.0	1.75	2.36	3.20	4.27	4.80	5.26	5.34	4.96	4.30	3.39	1.87	1.53	1311.4	3.6
40.0	1.81	2.40	3.19	4.20	4.66	5.08	5.19	4.88	4.30	3.44	1.92	1.59	1299.9	3.6
45.0	1.86	2.42	3.17	4.10	4.50	4.89	5.01	4.77	4.28	3.48	1.96	1.64	1282.0	3.5
50.0	1.89	2.43	3.13	3.99	4.33	4.68	4.82	4.65	4.23	3.50	1.98	1.67	1258.2	3.4
60.0	1.92	2.41	2.99	3.71	3.93	4.20	4.36	4.31	4.07	3.47	2.00	1.72	1190.3	3.3
70.0	1.90	2.33	2.80	3.35	3.45	3.63	3.81	3.89	3.81	3.36	1.97	1.72	1097.5	3.0
80.0	1.84	2.20	2.55	2.94	2.93	3.05	3.22	3.40	3.47	3.17	1.89	1.68	984.2	2.7
90.0	1.73	2.02	2.26	2.47	2.39	2.44	2.61	2.84	3.06	2.90	1.78	1.59	855.0	2.3

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MASSENA  
NY  
LATITUDE: 44 DEGREES 56 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.24	1.96	3.08	4.24	5.09	5.61	5.52	4.68	3.54	2.32	1.22	0.93	1201.3	3.3
10.0	1.47	2.21	3.34	4.41	5.17	5.64	5.61	4.89	3.86	2.67	1.46	1.12	1275.5	3.5
15.0	1.58	2.31	3.44	4.47	5.18	5.62	5.61	4.96	3.99	2.82	1.57	1.21	1302.7	3.6
20.0	1.68	2.41	3.52	4.49	5.15	5.57	5.59	4.99	4.09	2.96	1.67	1.29	1322.9	3.6
25.0	1.77	2.49	3.59	4.50	5.10	5.49	5.53	5.00	4.18	3.08	1.76	1.37	1335.9	3.7
30.0	1.85	2.56	3.63	4.48	5.02	5.38	5.44	4.98	4.24	3.18	1.84	1.44	1341.6	3.7
35.0	1.92	2.62	3.66	4.44	4.91	5.24	5.32	4.94	4.27	3.26	1.90	1.50	1339.9	3.7
40.0	1.98	2.65	3.66	4.37	4.78	5.08	5.18	4.87	4.29	3.33	1.96	1.55	1330.8	3.6
45.0	2.03	2.68	3.65	4.28	4.62	4.89	5.01	4.77	4.27	3.37	2.01	1.59	1314.5	3.6
50.0	2.06	2.69	3.61	4.17	4.46	4.69	4.82	4.65	4.24	3.40	2.04	1.62	1292.7	3.5
60.0	2.09	2.66	3.48	3.89	4.06	4.23	4.39	4.34	4.09	3.38	2.07	1.66	1228.3	3.4
70.0	2.07	2.58	3.28	3.53	3.59	3.69	3.86	3.93	3.85	3.29	2.06	1.65	1137.9	3.1
80.0	2.01	2.43	3.00	3.11	3.05	3.11	3.27	3.45	3.52	3.12	1.99	1.61	1025.0	2.8
90.0	1.89	2.24	2.67	2.63	2.51	2.52	2.68	2.91	3.12	2.87	1.88	1.53	896.1	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CENTRAL PARK NY  
LATITUDE: 40 DEGREES 47 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.58	2.27	3.26	4.30	5.16	5.39	5.32	4.68	3.82	2.82	1.68	1.28	1266.8	3.5
10.0	1.85	2.53	3.49	4.44	5.21	5.40	5.37	4.84	4.12	3.20	1.99	1.52	1339.5	3.7
15.0	1.97	2.64	3.58	4.48	5.20	5.36	5.35	4.89	4.23	3.37	2.13	1.64	1365.3	3.7
20.0	2.08	2.73	3.65	4.49	5.15	5.29	5.30	4.90	4.33	3.51	2.25	1.74	1383.8	3.8
25.0	2.18	2.81	3.70	4.48	5.08	5.19	5.23	4.89	4.39	3.64	2.37	1.83	1394.7	3.8
30.0	2.26	2.88	3.73	4.44	4.98	5.07	5.13	4.85	4.43	3.74	2.47	1.92	1397.9	3.8
35.0	2.34	2.92	3.74	4.38	4.86	4.92	5.00	4.79	4.45	3.82	2.55	1.99	1393.5	3.8
40.0	2.40	2.96	3.73	4.30	4.71	4.75	4.84	4.70	4.44	3.88	2.62	2.05	1381.5	3.8
45.0	2.44	2.97	3.70	4.20	4.55	4.57	4.67	4.59	4.41	3.91	2.68	2.10	1363.3	3.7
50.0	2.47	2.97	3.64	4.07	4.36	4.36	4.48	4.45	4.35	3.93	2.71	2.13	1338.0	3.7
60.0	2.49	2.92	3.48	3.77	3.93	3.89	4.04	4.12	4.16	3.88	2.74	2.17	1265.9	3.5
70.0	2.45	2.80	3.25	3.39	3.43	3.36	3.52	3.70	3.88	3.74	2.70	2.15	1167.3	3.2
80.0	2.35	2.62	2.94	2.95	2.89	2.81	2.96	3.20	3.52	3.52	2.60	2.08	1047.8	2.9
90.0	2.20	2.39	2.58	2.46	2.34	2.24	2.38	2.66	3.08	3.21	2.43	1.96	910.2	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LA GUARDIA NY  
LATITUDE: 40 DEGREES 46 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.73	2.51	3.52	4.60	5.33	5.69	5.62	4.99	4.03	3.00	1.87	1.44	1350.1	3.7
10.0	2.05	2.81	3.78	4.75	5.38	5.69	5.68	5.17	4.36	3.41	2.24	1.76	1434.0	3.9
15.0	2.19	2.94	3.88	4.79	5.37	5.65	5.66	5.22	4.48	3.59	2.41	1.90	1464.4	4.0
20.0	2.32	3.06	3.96	4.81	5.32	5.58	5.61	5.24	4.58	3.75	2.56	2.03	1486.8	4.1
25.0	2.44	3.15	4.02	4.80	5.25	5.48	5.53	5.23	4.66	3.89	2.70	2.15	1501.0	4.1
30.0	2.54	3.23	4.05	4.76	5.15	5.35	5.42	5.19	4.70	4.01	2.82	2.26	1506.7	4.1
35.0	2.63	3.29	4.07	4.69	5.02	5.19	5.29	5.12	4.73	4.10	2.93	2.36	1504.1	4.1
40.0	2.70	3.34	4.06	4.61	4.86	5.00	5.12	5.03	4.72	4.16	3.01	2.44	1493.1	4.1
45.0	2.76	3.36	4.02	4.50	4.69	4.81	4.94	4.91	4.69	4.21	3.08	2.50	1475.3	4.0
50.0	2.80	3.36	3.97	4.37	4.50	4.59	4.74	4.76	4.63	4.22	3.13	2.55	1449.5	4.0
60.0	2.83	3.31	3.80	4.04	4.06	4.09	4.26	4.40	4.43	4.18	3.17	2.60	1374.3	3.8
70.0	2.79	3.18	3.54	3.62	3.54	3.52	3.70	3.95	4.13	4.03	3.13	2.59	1269.7	3.5
80.0	2.68	2.98	3.21	3.15	2.98	2.94	3.11	3.42	3.74	3.79	3.02	2.51	1141.4	3.1
90.0	2.51	2.72	2.82	2.62	2.40	2.33	2.49	2.83	3.27	3.46	2.83	2.37	992.7	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ROCHESTER NY  
LATITUDE: 43 DEGREES 7 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.15	1.77	2.85	4.23	5.07	5.73	5.61	4.80	3.65	2.46	1.28	0.89	1203.1	3.3
10.0	1.40	1.94	3.05	4.37	5.13	5.75	5.69	4.99	3.96	2.81	1.49	1.10	1271.3	3.5
15.0	1.51	2.01	3.12	4.43	5.13	5.72	5.69	5.05	4.08	2.96	1.59	1.20	1295.4	3.5
20.0	1.62	2.08	3.19	4.45	5.09	5.66	5.65	5.08	4.18	3.09	1.68	1.29	1312.5	3.6
25.0	1.71	2.13	3.23	4.44	5.03	5.57	5.58	5.08	4.26	3.21	1.76	1.38	1322.5	3.6
30.0	1.80	2.17	3.26	4.42	4.95	5.45	5.49	5.05	4.31	3.31	1.83	1.45	1325.3	3.6
35.0	1.87	2.20	3.27	4.37	4.83	5.30	5.36	5.00	4.34	3.39	1.89	1.52	1320.8	3.6
40.0	1.94	2.22	3.26	4.29	4.70	5.12	5.20	4.91	4.34	3.44	1.94	1.58	1309.1	3.6
45.0	1.99	2.23	3.24	4.20	4.54	4.93	5.03	4.81	4.32	3.48	1.98	1.63	1290.9	3.5
50.0	2.02	2.22	3.20	4.09	4.37	4.72	4.83	4.68	4.27	3.50	2.00	1.67	1266.8	3.5
60.0	2.06	2.18	3.06	3.80	3.96	4.23	4.37	4.35	4.11	3.47	2.02	1.71	1198.4	3.3
70.0	2.05	2.09	2.87	3.43	3.48	3.67	3.83	3.92	3.85	3.36	1.99	1.71	1104.8	3.0
80.0	1.98	1.96	2.62	3.01	2.95	3.07	3.23	3.42	3.51	3.17	1.92	1.67	990.7	2.7
90.0	1.87	1.79	2.31	2.53	2.42	2.46	2.62	2.86	3.09	2.91	1.80	1.59	860.8	2.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SYRACUSE NY  
LATITUDE: 43 DEGREES 7 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.22	1.80	2.80	4.18	4.93	5.61	5.55	4.75	3.67	2.45	1.26	0.90	1193.6	3.5
10.0	1.41	1.98	2.99	4.33	5.04	5.63	5.62	4.94	3.99	2.80	1.47	1.12	1259.6	3.5
15.0	1.50	2.06	3.07	4.37	5.03	5.60	5.62	4.99	4.11	2.95	1.57	1.22	1282.8	3.5
20.0	1.57	2.13	3.13	4.39	5.00	5.54	5.58	5.02	4.21	3.08	1.65	1.32	1299.2	3.6
25.0	1.64	2.18	3.17	4.39	4.94	5.45	5.51	5.02	4.29	3.19	1.73	1.40	1308.5	3.6
30.0	1.70	2.23	3.20	4.36	4.86	5.33	5.42	5.00	4.34	3.29	1.80	1.48	1310.8	3.6
35.0	1.76	2.26	3.21	4.31	4.75	5.19	5.29	4.94	4.37	3.37	1.86	1.55	1305.8	3.6
40.0	1.80	2.28	3.20	4.24	4.61	5.02	5.14	4.86	4.37	3.43	1.90	1.61	1293.9	3.5
45.0	1.83	2.29	3.17	4.15	4.46	4.83	4.97	4.76	4.35	3.46	1.94	1.66	1275.5	3.5
50.0	1.85	2.29	3.13	4.03	4.29	4.62	4.77	4.63	4.30	3.48	1.97	1.70	1251.3	3.4
60.0	1.86	2.24	3.00	3.75	3.89	4.15	4.32	4.30	4.14	3.45	1.98	1.75	1183.1	3.2
70.0	1.83	2.15	2.81	3.39	3.42	3.60	3.79	3.88	3.88	3.34	1.95	1.75	1090.4	3.0
80.0	1.76	2.02	2.56	2.97	2.90	3.02	3.19	3.39	3.54	3.16	1.88	1.71	977.5	2.7
90.0	1.65	1.84	2.27	2.50	2.38	2.42	2.60	2.83	3.12	2.89	1.76	1.62	849.2	2.3



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: AKRON-CANTON OH  
LATITUDE: 40 DEGREES 55 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.35	2.05	3.03	4.28	5.26	5.80	5.63	5.04	4.01	2.86	1.59	1.11	1280.7	3.5
10.0	1.55	2.26	3.23	4.42	5.32	5.81	5.69	5.22	4.33	3.25	1.87	1.30	1348.5	3.7
15.0	1.64	2.34	3.31	4.46	5.30	5.77	5.67	5.27	4.45	3.42	2.00	1.39	1371.8	3.8
20.0	1.71	2.42	3.37	4.47	5.26	5.70	5.62	5.29	4.56	3.57	2.11	1.46	1387.6	3.8
25.0	1.78	2.48	3.41	4.45	5.18	5.59	5.55	5.28	4.63	3.70	2.22	1.53	1395.9	3.8
30.0	1.84	2.53	3.43	4.42	5.08	5.46	5.44	5.25	4.68	3.80	2.31	1.59	1396.5	3.8
35.0	1.89	2.57	3.44	4.36	4.96	5.30	5.30	5.18	4.70	3.89	2.38	1.65	1389.5	3.8
40.0	1.93	2.59	3.43	4.28	4.80	5.11	5.14	5.08	4.69	3.95	2.45	1.69	1375.0	3.8
45.0	1.96	2.60	3.39	4.18	4.64	4.91	4.95	4.96	4.66	3.99	2.49	1.72	1354.3	3.7
50.0	1.98	2.59	3.35	4.05	4.45	4.69	4.75	4.82	4.60	4.00	2.53	1.75	1326.7	3.6
60.0	1.98	2.54	3.19	3.75	4.01	4.18	4.28	4.45	4.40	3.96	2.55	1.76	1250.4	3.4
70.0	1.94	2.43	2.98	3.37	3.50	3.59	3.72	3.99	4.11	3.82	2.51	1.74	1148.0	3.1
80.0	1.86	2.27	2.70	2.94	2.95	3.00	3.12	3.46	3.72	3.59	2.41	1.68	1025.5	2.8
90.0	1.73	2.07	2.37	2.45	2.38	2.37	2.51	2.86	3.26	3.28	2.26	1.58	885.9	2.4

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: CINCINNATI OH  
 LATITUDE: 39 DEGREES 4 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.58	2.33	3.23	4.41	5.27	5.80	5.58	5.15	4.13	3.12	1.85	1.37	1335.4	3.7
10.0	1.81	2.57	3.44	4.54	5.31	5.79	5.62	5.32	4.44	3.53	2.18	1.61	1406.3	3.9
15.0	1.92	2.67	3.51	4.57	5.28	5.74	5.60	5.37	4.56	3.70	2.32	1.72	1430.6	3.9
20.0	2.01	2.76	3.57	4.57	5.23	5.65	5.54	5.38	4.65	3.86	2.45	1.82	1447.0	4.0
25.0	2.09	2.83	3.61	4.56	5.15	5.54	5.45	5.36	4.72	3.99	2.57	1.91	1455.5	4.0
30.0	2.17	2.89	3.63	4.51	5.04	5.40	5.34	5.31	4.75	4.10	2.67	1.99	1456.1	4.0
35.0	2.22	2.93	3.63	4.44	4.91	5.23	5.19	5.23	4.77	4.18	2.76	2.06	1448.6	4.0
40.0	2.27	2.95	3.61	4.35	4.75	5.04	5.03	5.13	4.75	4.24	2.83	2.12	1433.5	3.9
45.0	2.30	2.96	3.57	4.24	4.58	4.83	4.84	5.00	4.71	4.27	2.89	2.16	1411.9	3.9
50.0	2.33	2.95	3.52	4.11	4.39	4.61	4.63	4.84	4.64	4.28	2.92	2.20	1382.6	3.8
60.0	2.33	2.89	3.35	3.79	3.94	4.08	4.15	4.46	4.42	4.22	2.94	2.22	1302.1	3.6
70.0	2.27	2.76	3.11	3.39	3.41	3.49	3.59	3.98	4.11	4.05	2.89	2.19	1194.4	3.3
80.0	2.17	2.57	2.81	2.93	2.86	2.89	3.00	3.42	3.70	3.79	2.77	2.11	1066.2	2.9
90.0	2.02	2.33	2.45	2.43	2.29	2.28	2.39	2.81	3.22	3.45	2.58	1.98	919.7	2.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CLEVELAND OH  
LATITUDE: 41 DEGREES 24 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.23	1.90	2.90	4.26	5.30	5.82	5.76	4.99	3.91	2.73	1.47	1.00	1258.2	3.4
10.0	1.47	2.08	3.09	4.40	5.36	5.83	5.83	5.18	4.22	3.11	1.72	1.24	1327.0	3.6
15.0	1.59	2.15	3.16	4.44	5.35	5.79	5.81	5.23	4.35	3.27	1.84	1.34	1350.9	3.7
20.0	1.69	2.22	3.22	4.45	5.31	5.72	5.77	5.25	4.45	3.41	1.94	1.44	1367.4	3.7
25.0	1.78	2.27	3.25	4.44	5.24	5.62	5.69	5.25	4.52	3.54	2.03	1.53	1376.5	3.8
30.0	1.86	2.32	3.28	4.41	5.14	5.49	5.58	5.21	4.57	3.64	2.11	1.61	1377.9	3.8
35.0	1.93	2.35	3.28	4.35	5.01	5.33	5.44	5.15	4.59	3.72	2.18	1.69	1371.9	3.8
40.0	1.99	2.36	3.27	4.27	4.86	5.14	5.28	5.05	4.59	3.78	2.23	1.75	1358.3	3.7
45.0	2.04	2.37	3.24	4.17	4.69	4.94	5.09	4.94	4.56	3.82	2.28	1.80	1338.5	3.7
50.0	2.07	2.36	3.19	4.05	4.51	4.72	4.88	4.80	4.50	3.83	2.31	1.84	1311.9	3.6
60.0	2.10	2.31	3.05	3.75	4.07	4.21	4.40	4.44	4.31	3.79	2.32	1.88	1237.8	3.4
70.0	2.08	2.21	2.84	3.38	3.55	3.63	3.83	3.99	4.03	3.66	2.29	1.88	1137.7	3.1
80.0	2.00	2.06	2.58	2.94	2.99	3.03	3.21	3.46	3.66	3.44	2.20	1.82	1017.2	2.8
90.0	1.88	1.88	2.27	2.46	2.42	2.40	2.58	2.87	3.21	3.15	2.05	1.73	879.9	2.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: COLUMBUS OH  
 LATITUDE: 40 DEGREES 0 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.45	2.13	3.08	4.27	5.19	5.72	5.54	5.18	4.03	2.98	1.70	1.22	1294.9	3.5
10.0	1.66	2.35	3.28	4.40	5.23	5.72	5.58	5.36	4.25	3.38	1.99	1.44	1363.1	3.7
15.0	1.75	2.44	3.35	4.43	5.21	5.67	5.56	5.41	4.47	3.55	2.13	1.53	1386.4	3.8
20.0	1.84	2.51	3.41	4.43	5.16	5.60	5.51	5.42	4.56	3.70	2.25	1.62	1402.2	3.8
25.0	1.91	2.58	3.45	4.42	5.09	5.49	5.43	5.41	4.63	3.83	2.35	1.70	1410.4	3.9
30.0	1.98	2.63	3.47	4.38	4.99	5.36	5.32	5.37	4.67	3.94	2.45	1.76	1410.8	3.9
35.0	2.03	2.66	3.47	4.32	4.86	5.19	5.18	5.30	4.69	4.02	2.53	1.82	1403.6	3.8
40.0	2.07	2.68	3.46	4.23	4.71	5.00	5.01	5.19	4.68	4.08	2.59	1.87	1388.7	3.8
45.0	2.10	2.69	3.42	4.13	4.54	4.81	4.84	5.07	4.64	4.12	2.64	1.91	1367.8	3.7
50.0	2.12	2.68	3.37	4.00	4.35	4.58	4.63	4.91	4.58	4.13	2.68	1.94	1339.6	3.7
60.0	2.12	2.63	3.21	3.70	3.92	4.08	4.16	4.53	4.37	4.08	2.70	1.96	1262.0	3.5
70.0	2.08	2.51	2.99	3.32	3.41	3.50	3.61	4.05	4.07	3.93	2.65	1.93	1158.1	3.2
80.0	1.98	2.34	2.70	2.88	2.87	2.91	3.02	3.50	3.68	3.68	2.54	1.86	1034.2	2.8
90.0	1.85	2.13	2.37	2.40	2.31	2.30	2.42	2.88	3.21	3.35	2.37	1.75	892.8	2.4

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DAYTON  
OH  
LATITUDE: 39 DEGREES 54 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.54	2.29	3.22	4.43	5.36	5.91	5.70	5.19	4.15	3.06	1.78	1.29	1338.2	3.7
10.0	1.78	2.53	3.44	4.57	5.40	5.90	5.75	5.37	4.47	3.47	2.10	1.52	1411.3	3.9
15.0	1.89	2.64	3.52	4.60	5.38	5.86	5.73	5.42	4.60	3.65	2.24	1.63	1436.5	3.9
20.0	1.99	2.73	3.58	4.61	5.33	5.78	5.68	5.44	4.70	3.80	2.37	1.72	1453.9	4.0
25.0	2.07	2.80	3.63	4.59	5.26	5.67	5.59	5.42	4.77	3.94	2.49	1.81	1463.3	4.0
30.0	2.15	2.86	3.65	4.55	5.15	5.53	5.48	5.38	4.82	4.05	2.59	1.88	1464.6	4.0
35.0	2.21	2.90	3.65	4.49	5.02	5.36	5.34	5.31	4.84	4.14	2.68	1.95	1457.9	4.0
40.0	2.26	2.93	3.64	4.40	4.86	5.16	5.16	5.20	4.83	4.20	2.75	2.00	1443.2	4.0
45.0	2.30	2.94	3.60	4.29	4.69	4.95	4.98	5.08	4.79	4.23	2.81	2.05	1422.2	3.9
50.0	2.32	2.94	3.55	4.16	4.49	4.72	4.77	4.92	4.72	4.25	2.84	2.08	1393.4	3.8
60.0	2.33	2.88	3.38	3.84	4.04	4.20	4.28	4.54	4.51	4.19	2.87	2.10	1313.6	3.6
70.0	2.28	2.76	3.15	3.45	3.51	3.59	3.71	4.06	4.20	4.04	2.82	2.08	1206.1	3.3
80.0	2.18	2.57	2.85	2.99	2.95	2.98	3.10	3.50	3.79	3.79	2.71	2.01	1077.5	3.0
90.0	2.03	2.34	2.50	2.48	2.37	2.35	2.47	2.88	3.31	3.45	2.53	1.89	930.3	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: TOLEDO OH  
LATITUDE: 41 DEGREES 36 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.37	2.14	3.14	4.36	5.42	5.92	5.83	5.09	4.01	2.87	1.57	1.12	1306.2	3.6
10.0	1.59	2.38	3.36	4.51	5.48	5.93	5.90	5.29	4.35	3.28	1.86	1.33	1379.6	3.8
15.0	1.69	2.48	3.45	4.55	5.46	5.90	5.89	5.35	4.48	3.46	1.99	1.42	1405.3	3.9
20.0	1.78	2.57	3.51	4.57	5.42	5.83	5.84	5.37	4.59	3.62	2.11	1.51	1423.3	3.9
25.0	1.85	2.65	3.56	4.56	5.35	5.72	5.76	5.37	4.67	3.75	2.22	1.58	1433.5	3.9
30.0	1.92	2.71	3.59	4.52	5.25	5.59	5.65	5.33	4.72	3.87	2.31	1.65	1435.8	3.9
35.0	1.98	2.75	3.60	4.47	5.12	5.43	5.51	5.27	4.75	3.96	2.40	1.71	1430.2	3.9
40.0	2.03	2.78	3.59	4.39	4.97	5.24	5.34	5.18	4.75	4.02	2.46	1.76	1416.7	3.9
45.0	2.06	2.80	3.56	4.28	4.80	5.03	5.16	5.06	4.72	4.07	2.51	1.80	1396.6	3.8
50.0	2.09	2.80	3.52	4.16	4.61	4.81	4.95	4.91	4.66	4.09	2.55	1.83	1369.4	3.8
60.0	2.10	2.75	3.36	3.86	4.16	4.29	4.46	4.55	4.47	4.05	2.58	1.85	1293.1	3.5
70.0	2.06	2.64	3.14	3.47	3.63	3.69	3.88	4.09	4.18	3.91	2.54	1.84	1189.5	3.3
80.0	1.97	2.47	2.85	3.03	3.06	3.08	3.25	3.54	3.79	3.69	2.45	1.78	1064.2	2.9
90.0	1.84	2.26	2.51	2.53	2.48	2.44	2.61	2.94	3.33	3.37	2.30	1.67	921.1	2.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: YOUNGSTOWN OH  
LATITUDE: 41 DEGREES 16 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.22	1.85	2.80	4.03	5.00	5.55	5.47	4.75	3.76	2.69	1.44	1.00	1205.7	3.3
10.0	1.46	2.02	2.98	4.16	5.05	5.55	5.53	4.92	4.06	3.05	1.68	1.22	1270.4	3.5
15.0	1.57	2.09	3.04	4.19	5.04	5.52	5.51	4.96	4.17	3.20	1.79	1.33	1292.8	3.5
20.0	1.67	2.15	3.09	4.20	5.00	5.45	5.47	4.98	4.27	3.34	1.88	1.42	1308.2	3.6
25.0	1.76	2.20	3.13	4.19	4.93	5.35	5.39	4.97	4.34	3.46	1.97	1.51	1316.6	3.6
30.0	1.83	2.24	3.14	4.15	4.84	5.23	5.29	4.94	4.38	3.56	2.05	1.59	1317.8	3.6
35.0	1.90	2.26	3.15	4.10	4.72	5.08	5.16	4.88	4.40	3.63	2.11	1.66	1311.9	3.6
40.0	1.96	2.28	3.13	4.02	4.58	4.90	5.00	4.79	4.39	3.69	2.16	1.72	1298.8	3.6
45.0	2.00	2.28	3.10	3.93	4.42	4.71	4.83	4.68	4.36	3.72	2.20	1.77	1280.0	3.5
50.0	2.04	2.27	3.05	3.82	4.24	4.50	4.63	4.54	4.31	3.73	2.23	1.81	1254.6	3.4
60.0	2.06	2.22	2.91	3.53	3.83	4.02	4.17	4.20	4.12	3.69	2.24	1.85	1184.1	3.2
70.0	2.04	2.12	2.72	3.18	3.35	3.47	3.64	3.78	3.85	3.56	2.20	1.84	1089.2	3.0
80.0	1.97	1.98	2.47	2.78	2.83	2.90	3.06	3.28	3.49	3.35	2.11	1.79	974.9	2.7
90.0	1.84	1.80	2.17	2.33	2.30	2.31	2.47	2.72	3.06	3.06	1.98	1.69	844.7	2.3

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: OKLAHOMA CITY OK  
 LATITUDE: 35 DEGREES 24 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.52	3.33	4.41	5.44	6.04	6.76	6.71	6.16	4.90	3.89	2.84	2.29	1683.5	4.6
10.0	2.94	3.70	4.70	5.58	6.04	6.71	6.72	6.33	5.24	4.38	3.36	2.75	1780.6	4.9
15.0	3.13	3.86	4.81	5.60	6.00	6.62	6.66	6.37	5.37	4.59	3.60	2.96	1814.0	5.0
20.0	3.30	3.99	4.89	5.60	5.92	6.50	6.57	6.37	5.47	4.78	3.81	3.15	1837.1	5.0
25.0	3.45	4.10	4.94	5.56	5.80	6.34	6.44	6.33	5.54	4.93	4.00	3.32	1849.5	5.1
30.0	3.58	4.18	4.97	5.49	5.66	6.15	6.28	6.25	5.57	5.05	4.16	3.47	1851.3	5.1
35.0	3.68	4.25	4.96	5.39	5.48	5.92	6.08	6.14	5.57	5.15	4.30	3.61	1842.3	5.0
40.0	3.77	4.28	4.93	5.27	5.29	5.68	5.86	6.00	5.54	5.21	4.41	3.71	1824.5	5.0
45.0	3.83	4.30	4.87	5.11	5.07	5.41	5.61	5.82	5.47	5.24	4.49	3.80	1796.3	4.9
50.0	3.87	4.28	4.78	4.93	4.83	5.12	5.33	5.61	5.37	5.23	4.55	3.86	1757.9	4.8
60.0	3.88	4.18	4.52	4.50	4.27	4.45	4.69	5.10	5.08	5.13	4.57	3.91	1651.4	4.5
70.0	3.79	3.98	4.17	3.97	3.63	3.72	3.95	4.48	4.68	4.90	4.48	3.86	1509.1	4.1
80.0	3.60	3.69	3.72	3.37	2.98	2.98	3.22	3.78	4.17	4.55	4.27	3.71	1339.5	3.7
90.0	3.33	3.32	3.20	2.72	2.31	2.26	2.45	3.02	3.57	4.10	3.96	3.47	1146.6	3.1



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: TULSA OK  
LATITUDE: 36 DEGREES 12 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.30	3.08	4.11	5.06	5.74	6.37	6.39	5.89	4.64	3.67	2.60	2.08	1582.2	4.3
10.0	2.69	3.42	4.38	5.19	5.76	6.33	6.41	6.06	4.97	4.14	3.08	2.50	1672.7	4.6
15.0	2.86	3.57	4.48	5.21	5.72	6.26	6.36	6.10	5.09	4.33	3.29	2.69	1704.0	4.7
20.0	3.01	3.69	4.55	5.21	5.64	6.15	6.28	6.10	5.18	4.51	3.48	2.86	1725.7	4.7
25.0	3.15	3.79	4.60	5.18	5.54	6.01	6.16	6.07	5.24	4.65	3.65	3.02	1737.6	4.8
30.0	3.26	3.87	4.63	5.11	5.41	5.83	6.01	6.00	5.28	4.77	3.80	3.16	1739.6	4.8
35.0	3.36	3.93	4.62	5.02	5.25	5.63	5.83	5.90	5.28	4.86	3.93	3.28	1731.7	4.7
40.0	3.44	3.96	4.59	4.91	5.07	5.41	5.62	5.76	5.25	4.92	4.03	3.38	1715.2	4.7
45.0	3.50	3.97	4.54	4.77	4.87	5.16	5.39	5.60	5.19	4.95	4.10	3.45	1689.5	4.6
50.0	3.53	3.96	4.46	4.61	4.64	4.89	5.13	5.41	5.10	4.95	4.15	3.51	1654.2	4.5
60.0	3.54	3.87	4.23	4.22	4.12	4.28	4.53	4.93	4.84	4.85	4.18	3.56	1556.2	4.3
70.0	3.46	3.69	3.90	3.74	3.53	3.60	3.85	4.35	4.46	4.64	4.09	3.51	1424.8	3.9
80.0	3.30	3.43	3.49	3.19	2.92	2.92	3.15	3.68	3.99	4.32	3.91	3.38	1267.9	3.5
90.0	3.06	3.09	3.02	2.60	2.28	2.25	2.42	2.96	3.43	3.90	3.63	3.17	1088.6	3.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJ/H/SQ. M)

SITE: ASTORIA  
LATITUDE: 46 DEGREES OR  
9 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.99	1.72	2.73	3.95	5.07	5.12	5.51	4.72	3.73	2.25	1.22	0.82	1153.8	3.2
10.0	1.24	1.93	2.94	4.12	5.16	5.16	5.62	4.95	4.10	2.61	1.49	1.00	1229.0	3.4
15.0	1.35	2.02	3.03	4.17	5.16	5.14	5.63	5.02	4.25	2.76	1.61	1.08	1256.9	3.4
20.0	1.46	2.10	3.10	4.20	5.14	5.10	5.60	5.07	4.38	2.91	1.72	1.15	1278.2	3.5
25.0	1.56	2.16	3.16	4.21	5.10	5.03	5.55	5.08	4.48	3.03	1.82	1.22	1292.4	3.5
30.0	1.64	2.22	3.20	4.19	5.02	4.94	5.47	5.07	4.56	3.14	1.92	1.28	1299.9	3.6
35.0	1.72	2.26	3.22	4.16	4.92	4.82	5.36	5.03	4.61	3.23	2.00	1.33	1300.0	3.6
40.0	1.79	2.30	3.22	4.10	4.80	4.68	5.22	4.97	4.63	3.30	2.06	1.38	1293.0	3.5
45.0	1.84	2.32	3.21	4.01	4.64	4.51	5.05	4.87	4.63	3.35	2.12	1.41	1278.8	3.5
50.0	1.89	2.32	3.18	3.92	4.48	4.33	4.87	4.75	4.60	3.37	2.16	1.44	1259.0	3.4
60.0	1.94	2.30	3.06	3.66	4.09	3.92	4.44	4.45	4.46	3.37	2.21	1.48	1199.7	3.3
70.0	1.94	2.22	2.89	3.34	3.63	3.44	3.93	4.04	4.21	3.29	2.20	1.48	1115.0	3.1
80.0	1.89	2.10	2.65	2.95	3.10	2.92	3.34	3.56	3.87	3.13	2.14	1.44	1007.7	2.8
90.0	1.79	1.94	2.36	2.51	2.56	2.40	2.75	3.01	3.44	2.89	2.03	1.37	884.3	2.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BURNS  
OR  
LATITUDE: 43 DEGREES 35 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.55	2.50	3.74	5.20	6.47	7.19	7.75	6.57	5.10	3.28	1.87	1.36	1603.0	4.4
10.0	1.87	2.85	4.07	5.43	6.59	7.24	7.90	6.92	5.67	3.86	2.33	1.71	1720.4	4.7
15.0	2.02	3.01	4.20	5.50	6.59	7.20	7.91	7.03	5.90	4.12	2.53	1.88	1764.5	4.8
20.0	2.16	3.15	4.31	5.54	6.55	7.13	7.88	7.10	6.09	4.35	2.72	2.03	1798.4	4.9
25.0	2.28	3.27	4.40	5.55	6.48	7.02	7.79	7.13	6.25	4.55	2.90	2.17	1821.6	5.0
30.0	2.39	3.37	4.46	5.52	6.37	6.86	7.66	7.12	6.37	4.73	3.05	2.30	1834.0	5.0
35.0	2.49	3.45	4.49	5.47	6.23	6.67	7.48	7.06	6.45	4.87	3.19	2.41	1835.5	5.0
40.0	2.57	3.51	4.50	5.38	6.05	6.44	7.25	6.95	6.48	4.98	3.31	2.51	1826.0	5.0
45.0	2.63	3.55	4.48	5.27	5.84	6.18	6.99	6.81	6.48	5.07	3.40	2.59	1806.5	4.9
50.0	2.68	3.57	4.44	5.13	5.61	5.91	6.71	6.64	6.43	5.12	3.48	2.66	1778.1	4.9
60.0	2.73	3.54	4.28	4.77	5.07	5.27	6.04	6.17	6.22	5.12	3.56	2.74	1690.2	4.6
70.0	2.71	3.43	4.02	4.31	4.43	4.52	5.22	5.55	5.86	4.99	3.55	2.75	1563.1	4.3
80.0	2.62	3.24	3.57	3.76	3.71	3.73	4.32	4.81	5.35	4.74	3.45	2.69	1402.7	3.8
90.0	2.47	2.98	3.25	3.14	2.98	2.92	3.41	3.97	4.71	4.36	3.26	2.56	1217.1	3.3

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MEDFORD  
OR  
LATITUDE: 42 DEGREES 22 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.29	2.33	3.57	5.17	6.41	7.18	7.80	6.68	5.01	3.09	1.59	1.06	1560.5	4.3
10.0	1.49	2.62	3.86	5.39	6.51	7.21	7.94	7.02	5.52	3.58	1.91	1.26	1655.1	4.5
15.0	1.58	2.75	3.97	5.45	6.50	7.17	7.93	7.13	5.73	3.79	2.05	1.35	1688.5	4.6
20.0	1.66	2.86	4.06	5.48	6.46	7.09	7.89	7.19	5.90	3.98	2.18	1.43	1712.2	4.7
25.0	1.73	2.95	4.13	5.48	6.38	6.97	7.79	7.21	6.04	4.15	2.30	1.51	1725.8	4.7
30.0	1.80	3.03	4.18	5.45	6.26	6.80	7.64	7.18	6.14	4.29	2.40	1.57	1729.4	4.7
35.0	1.85	3.09	4.20	5.39	6.11	6.60	7.45	7.11	6.20	4.41	2.49	1.63	1722.8	4.7
40.0	1.89	3.14	4.20	5.30	5.93	6.37	7.22	7.00	6.22	4.50	2.57	1.68	1706.2	4.7
45.0	1.93	3.16	4.18	5.18	5.72	6.11	6.96	6.85	6.20	4.56	2.63	1.72	1681.0	4.6
50.0	1.95	3.17	4.13	5.04	5.49	5.83	6.66	6.66	6.15	4.59	2.67	1.75	1647.3	4.5
60.0	1.96	3.13	3.96	4.67	4.94	5.18	5.97	6.17	5.93	4.57	2.71	1.77	1551.6	4.3
70.0	1.92	3.02	3.71	4.20	4.30	4.42	5.14	5.53	5.56	4.43	2.68	1.76	1421.0	3.9
80.0	1.85	2.84	3.38	3.66	3.59	3.64	4.23	4.77	5.06	4.18	2.59	1.70	1262.3	3.5
90.0	1.73	2.60	2.98	3.04	2.87	2.82	3.31	3.90	4.44	3.84	2.43	1.60	1081.8	3.0

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KMH/SQ. M)

SITE: NORTH BEND  
OR  
LATITUDE: 43 DEGREES 25 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.39	2.22	3.33	4.76	5.86	6.29	6.64	5.64	4.34	2.81	1.66	1.20	1406.3	3.9
10.0	1.65	2.51	3.60	4.96	5.95	6.32	6.76	5.90	4.76	3.25	2.02	1.48	1498.5	4.1
15.0	1.77	2.63	3.71	5.01	5.95	6.29	6.76	5.98	4.93	3.44	2.19	1.61	1532.3	4.2
20.0	1.88	2.74	3.80	5.04	5.91	6.22	6.72	6.03	5.07	3.62	2.34	1.73	1557.6	4.3
25.0	1.97	2.84	3.86	5.04	5.85	6.13	6.64	6.05	5.18	3.77	2.48	1.84	1574.0	4.3
30.0	2.06	2.92	3.91	5.02	5.75	5.99	6.53	6.02	5.26	3.89	2.61	1.94	1581.4	4.3
35.0	2.14	2.98	3.93	4.97	5.62	5.83	6.38	5.97	5.31	4.00	2.72	2.03	1579.8	4.3
40.0	2.20	3.02	3.93	4.89	5.46	5.63	6.19	5.87	5.33	4.08	2.81	2.10	1569.2	4.3
45.0	2.25	3.05	3.91	4.73	5.27	5.41	5.97	5.75	5.32	4.13	2.89	2.17	1550.3	4.2
50.0	2.28	3.06	3.87	4.65	5.07	5.18	5.74	5.60	5.27	4.16	2.94	2.22	1524.1	4.2
60.0	2.31	3.03	3.72	4.33	4.59	4.63	5.18	5.20	5.08	4.15	3.00	2.27	1446.1	4.0
70.0	2.29	2.93	3.49	3.91	4.02	4.00	4.51	4.69	4.78	4.03	2.98	2.27	1336.2	3.7
80.0	2.21	2.76	3.19	3.42	3.38	3.34	3.76	4.08	4.36	3.81	2.89	2.22	1199.4	3.3
90.0	2.08	2.53	2.82	2.86	2.74	2.65	3.01	3.39	3.84	3.50	2.73	2.10	1042.3	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PENDLETON  
OR  
LATITUDE: 45 DEGREES 41 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.10	1.93	3.29	4.74	6.07	6.77	7.55	6.29	4.73	2.86	1.38	0.92	1453.1	4.0
10.0	1.30	2.19	3.59	4.96	6.19	6.83	7.73	6.66	5.29	3.38	1.70	1.14	1554.0	4.3
15.0	1.39	2.30	3.71	5.03	6.20	6.81	7.76	6.78	5.52	3.61	1.85	1.24	1591.5	4.4
20.0	1.48	2.40	3.81	5.07	6.18	6.75	7.73	6.87	5.71	3.82	1.99	1.33	1620.2	4.4
25.0	1.55	2.49	3.89	5.08	6.12	6.66	7.67	6.91	5.87	4.01	2.11	1.41	1639.4	4.5
30.0	1.62	2.56	3.94	5.07	6.03	6.53	7.56	6.91	5.99	4.17	2.22	1.49	1649.0	4.5
35.0	1.67	2.62	3.98	5.03	5.91	6.36	7.40	6.87	6.08	4.30	2.32	1.55	1649.0	4.5
40.0	1.72	2.66	3.99	4.96	5.75	6.16	7.20	6.78	6.13	4.41	2.40	1.61	1639.4	4.5
45.0	1.76	2.69	3.98	4.86	5.56	5.93	6.95	6.66	6.14	4.49	2.47	1.66	1620.1	4.4
50.0	1.79	2.70	3.95	4.74	5.36	5.68	6.69	6.50	6.11	4.54	2.53	1.70	1593.6	4.4
60.0	1.81	2.68	3.82	4.43	4.88	5.11	6.06	6.07	5.94	4.56	2.59	1.74	1514.0	4.1
70.0	1.50	2.60	3.60	4.03	4.30	4.43	5.29	5.50	5.62	4.46	2.58	1.74	1399.9	3.8
80.0	1.74	2.46	3.31	3.54	3.63	3.70	4.41	4.81	5.16	4.25	2.51	1.70	1255.7	3.4
90.0	1.64	2.26	2.94	2.99	2.96	2.95	3.53	4.01	4.58	3.93	2.38	1.62	1090.7	3.0

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: PORTLAND  
 OR  
 LATITUDE: 45 DEGREES 36 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.98	1.75	2.82	4.13	5.24	5.59	6.42	5.27	3.83	2.28	1.22	0.82	1231.0	3.4
10.0	1.21	1.95	3.05	4.30	5.33	5.64	6.56	5.54	4.21	2.63	1.48	1.06	1310.0	3.6
15.0	1.31	2.04	3.14	4.36	5.34	5.61	6.57	5.63	4.37	2.79	1.59	1.17	1339.1	3.7
20.0	1.41	2.12	3.21	4.39	5.32	5.57	6.55	5.68	4.50	2.92	1.70	1.27	1361.0	3.7
25.0	1.50	2.19	3.27	4.39	5.27	5.49	6.49	5.71	4.60	3.05	1.79	1.37	1375.3	3.8
30.0	1.58	2.24	3.31	4.37	5.19	5.38	6.39	5.70	4.68	3.15	1.88	1.45	1381.9	3.8
35.0	1.65	2.29	3.33	4.33	5.08	5.25	6.26	5.65	4.73	3.24	1.95	1.53	1380.8	3.8
40.0	1.71	2.32	3.33	4.27	4.95	5.09	6.09	5.58	4.75	3.30	2.02	1.60	1371.9	3.8
45.0	1.76	2.34	3.32	4.19	4.79	4.90	5.89	5.47	4.74	3.35	2.07	1.66	1355.4	3.7
50.0	1.80	2.34	3.28	4.08	4.62	4.70	5.67	5.34	4.71	3.38	2.11	1.70	1333.1	3.7
60.0	1.84	2.32	3.16	3.81	4.21	4.25	5.15	4.99	4.56	3.37	2.15	1.77	1266.9	3.5
70.0	1.84	2.24	2.98	3.47	3.72	3.71	4.52	4.53	4.30	3.28	2.13	1.78	1173.4	3.2
80.0	1.79	2.11	2.73	3.06	3.17	3.14	3.81	3.97	3.95	3.12	2.07	1.75	1055.8	2.9
90.0	1.70	1.94	2.43	2.59	2.61	2.55	3.09	3.34	3.51	2.88	1.96	1.67	921.7	2.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: REDMOND  
 OR  
 LATITUDE: 44 DEGREES 16 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.55	2.44	3.75	5.31	6.55	7.21	7.72	6.53	4.99	3.15	1.81	1.34	1596.1	4.4
10.0	1.90	2.80	4.09	5.56	6.68	7.27	7.88	6.89	5.56	3.71	2.25	1.71	1716.0	4.7
15.0	2.05	2.96	4.23	5.64	6.69	7.24	7.90	7.01	5.79	3.96	2.46	1.88	1761.5	4.8
20.0	2.20	3.10	4.35	5.68	6.66	7.17	7.86	7.08	5.98	4.18	2.65	2.04	1796.7	4.9
25.0	2.33	3.22	4.44	5.70	6.59	7.06	7.78	7.11	6.14	4.38	2.82	2.19	1821.2	5.0
30.0	2.45	3.32	4.51	5.68	6.48	6.91	7.66	7.10	6.26	4.55	2.98	2.32	1835.0	5.0
35.0	2.55	3.40	4.54	5.63	6.34	6.72	7.48	7.05	6.34	4.69	3.11	2.44	1837.7	5.0
40.0	2.64	3.47	4.56	5.54	6.16	6.50	7.27	6.95	6.39	4.81	3.23	2.54	1829.5	5.0
45.0	2.71	3.51	4.54	5.43	5.95	6.24	7.01	6.82	6.39	4.89	3.33	2.63	1810.8	5.0
50.0	2.77	3.53	4.50	5.29	5.72	5.97	6.74	6.65	6.35	4.94	3.40	2.70	1783.7	4.9
60.0	2.83	3.51	4.35	4.93	5.18	5.33	6.07	6.19	6.15	4.95	3.49	2.79	1698.0	4.7
70.0	2.81	3.41	4.09	4.46	4.53	4.59	5.27	5.58	5.80	4.83	3.49	2.81	1572.8	4.3
80.0	2.73	3.22	3.74	3.90	3.79	3.79	4.37	4.85	5.31	4.59	3.39	2.75	1413.4	3.9
90.0	2.58	2.96	3.32	3.26	3.06	2.98	3.46	4.01	4.69	4.23	3.21	2.62	1228.9	3.4



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SALEM  
LATITUDE: 44 DEGREES 55 MINUTES OR

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.05	1.86	2.98	4.33	5.48	5.83	6.76	5.59	4.19	2.42	1.30	0.87	1300.9	3.6
10.0	1.29	2.08	3.22	4.51	5.58	5.87	6.89	5.88	4.62	2.80	1.56	1.12	1385.2	3.8
15.0	1.41	2.17	3.32	4.56	5.58	5.84	6.91	5.97	4.79	2.96	1.68	1.24	1416.2	3.9
20.0	1.51	2.26	3.40	4.59	5.56	5.79	6.88	6.03	4.94	3.11	1.79	1.35	1439.3	3.9
25.0	1.60	2.33	3.46	4.60	5.50	5.71	6.81	6.05	5.06	3.24	1.89	1.45	1454.4	4.0
30.0	1.69	2.39	3.50	4.58	5.41	5.59	6.70	6.04	5.14	3.35	1.98	1.54	1461.3	4.0
35.0	1.76	2.44	3.52	4.54	5.30	5.45	6.56	5.99	5.20	3.44	2.06	1.62	1459.8	4.0
40.0	1.83	2.47	3.53	4.47	5.15	5.28	6.38	5.91	5.23	3.51	2.13	1.69	1450.1	4.0
45.0	1.88	2.49	3.51	4.37	4.99	5.08	6.16	5.79	5.22	3.56	2.18	1.75	1432.2	3.9
50.0	1.92	2.50	3.48	4.26	4.80	4.87	5.93	5.65	5.18	3.59	2.22	1.80	1408.3	3.9
60.0	1.97	2.47	3.35	3.98	4.37	4.39	5.37	5.27	5.02	3.58	2.26	1.86	1337.0	3.7
70.0	1.96	2.39	3.15	3.61	3.85	3.82	4.69	4.77	4.73	3.48	2.25	1.87	1236.5	3.4
80.0	1.91	2.25	2.88	3.18	3.27	3.22	3.93	4.17	4.33	3.30	2.18	1.84	1110.5	3.0
90.0	1.81	2.07	2.56	2.68	2.68	2.60	3.17	3.49	3.84	3.04	2.06	1.76	966.8	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ALLENTOWN PA  
 LATITUDE: 40 DEGREES 39 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.66	2.41	3.39	4.45	5.16	5.60	5.57	4.88	3.90	2.92	1.79	1.36	1313.1	3.6
10.0	1.96	2.69	3.64	4.60	5.21	5.61	5.62	5.05	4.21	3.32	2.14	1.64	1391.2	3.8
15.0	2.09	2.81	3.73	4.63	5.19	5.56	5.60	5.09	4.32	3.49	2.29	1.77	1419.2	3.9
20.0	2.22	2.92	3.80	4.64	5.15	5.49	5.55	5.11	4.42	3.64	2.43	1.88	1439.4	3.9
25.0	2.32	3.01	3.86	4.63	5.08	5.39	5.47	5.10	4.49	3.78	2.56	1.99	1451.8	4.0
30.0	2.42	3.08	3.89	4.59	4.98	5.27	5.37	5.06	4.53	3.88	2.67	2.08	1456.1	4.0
35.0	2.50	3.13	3.90	4.53	4.85	5.11	5.23	4.99	4.55	3.97	2.76	2.16	1452.4	4.0
40.0	2.57	3.17	3.89	4.45	4.70	4.93	5.06	4.90	4.54	4.03	2.84	2.23	1440.6	3.9
45.0	2.62	3.19	3.86	4.34	4.54	4.74	4.89	4.78	4.51	4.07	2.90	2.29	1422.3	3.9
50.0	2.65	3.19	3.80	4.21	4.36	4.52	4.63	4.64	4.45	4.08	2.95	2.33	1396.5	3.8
60.0	2.68	3.14	3.63	3.89	3.93	4.03	4.21	4.29	4.25	4.04	2.98	2.37	1322.3	3.6
70.0	2.63	3.01	3.39	3.50	3.43	3.47	3.66	3.85	3.96	3.89	2.94	2.36	1220.0	3.3
80.0	2.53	2.82	3.07	3.04	2.89	2.90	3.07	3.33	3.59	3.66	2.83	2.28	1095.5	3.0
90.0	2.37	2.57	2.69	2.53	2.33	2.30	2.47	2.76	3.14	3.34	2.65	2.15	951.9	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ERIE PA  
LATITUDE: 42 DEGREES 5 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.09	1.82	2.89	4.29	5.19	5.82	5.78	4.59	3.78	2.61	1.31	0.88	1220.9	3.3
10.0	1.30	2.00	3.09	4.44	5.25	5.83	5.85	4.76	4.09	2.97	1.52	1.07	1285.5	3.5
15.0	1.39	2.07	3.16	4.48	5.24	5.80	5.84	4.81	4.21	3.13	1.62	1.16	1307.8	3.6
20.0	1.48	2.13	3.22	4.50	5.20	5.73	5.80	4.83	4.31	3.26	1.70	1.24	1323.0	3.6
25.0	1.56	2.18	3.26	4.49	5.13	5.63	5.73	4.83	4.39	3.38	1.78	1.31	1331.0	3.6
30.0	1.63	2.22	3.29	4.46	5.04	5.51	5.62	4.79	4.44	3.48	1.84	1.38	1331.7	3.6
35.0	1.69	2.25	3.30	4.40	4.92	5.35	5.48	4.74	4.46	3.56	1.90	1.44	1325.2	3.6
40.0	1.74	2.27	3.28	4.32	4.77	5.17	5.32	4.65	4.46	3.62	1.95	1.49	1311.5	3.6
45.0	1.78	2.27	3.26	4.23	4.61	4.97	5.13	4.55	4.43	3.66	1.98	1.53	1291.6	3.5
50.0	1.80	2.27	3.21	4.11	4.43	4.75	4.93	4.42	4.38	3.67	2.00	1.56	1265.5	3.5
60.0	1.83	2.22	3.07	3.81	4.01	4.24	4.44	4.10	4.20	3.64	2.01	1.59	1193.3	3.3
70.0	1.81	2.12	2.87	3.43	3.51	3.66	3.88	3.69	3.93	3.52	1.98	1.59	1096.2	3.0
80.0	1.74	1.99	2.61	3.00	2.97	3.06	3.25	3.22	3.57	3.31	1.90	1.54	979.5	2.7
90.0	1.63	1.81	2.30	2.51	2.41	2.44	2.62	2.68	3.14	3.03	1.78	1.46	847.2	2.3

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: HARRISBURG PA  
LATITUDE: 40 DEGREES 13 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.69	2.43	3.41	4.45	5.21	5.70	5.56	4.89	3.99	2.95	1.83	1.41	1325.5	3.6
10.0	1.98	2.71	3.65	4.59	5.26	5.69	5.61	5.06	4.30	3.34	2.17	1.70	1403.2	3.8
15.0	2.11	2.83	3.74	4.63	5.24	5.65	5.59	5.10	4.42	3.51	2.33	1.83	1430.8	3.9
20.0	2.23	2.93	3.81	4.64	5.19	5.58	5.53	5.11	4.51	3.66	2.47	1.96	1450.7	4.0
25.0	2.34	3.02	3.86	4.62	5.12	5.47	5.45	5.10	4.58	3.79	2.59	2.07	1462.5	4.0
30.0	2.44	3.09	3.89	4.58	5.01	5.34	5.34	5.06	4.63	3.90	2.70	2.16	1466.3	4.0
35.0	2.52	3.14	3.90	4.52	4.89	5.18	5.21	4.99	4.64	3.98	2.80	2.25	1462.0	4.0
40.0	2.58	3.18	3.89	4.43	4.73	4.99	5.04	4.90	4.63	4.04	2.88	2.32	1449.6	4.0
45.0	2.63	3.20	3.85	4.33	4.57	4.80	4.86	4.78	4.60	4.08	2.94	2.38	1430.8	3.9
50.0	2.66	3.20	3.30	4.20	4.38	4.58	4.66	4.63	4.54	4.09	2.98	2.42	1404.2	3.8
60.0	2.68	3.14	3.63	3.88	3.94	4.07	4.19	4.28	4.33	4.04	3.01	2.46	1328.4	3.6
70.0	2.64	3.01	3.38	3.48	3.43	3.50	3.63	3.83	4.04	3.89	2.97	2.44	1224.5	3.4
80.0	2.53	2.82	3.06	3.02	2.89	2.91	3.05	3.31	3.65	3.65	2.85	2.37	1098.5	3.0
90.0	2.37	2.56	2.68	2.51	2.33	2.30	2.44	2.74	3.19	3.33	2.67	2.23	953.3	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PHILADELPHIA PA  
LATITUDE: 39 DEGREES 53 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.75	2.51	3.49	4.52	5.24	5.71	5.55	4.97	4.03	3.02	1.95	1.49	1347.0	3.7
10.0	2.06	2.80	3.73	4.66	5.28	5.70	5.59	5.14	4.34	3.43	2.33	1.79	1427.2	3.9
15.0	2.19	2.92	3.83	4.70	5.26	5.66	5.57	5.18	4.46	3.60	2.50	1.93	1455.8	4.0
20.0	2.32	3.03	3.90	4.71	5.21	5.58	5.52	5.19	4.56	3.75	2.65	2.06	1476.5	4.0
25.0	2.43	3.12	3.95	4.69	5.13	5.48	5.44	5.18	4.63	3.88	2.79	2.18	1489.0	4.1
30.0	2.53	3.19	3.98	4.65	5.03	5.34	5.33	5.14	4.67	3.99	2.91	2.28	1493.3	4.1
35.0	2.61	3.25	3.99	4.59	4.90	5.18	5.19	5.07	4.68	4.08	3.02	2.37	1489.3	4.1
40.0	2.68	3.28	3.98	4.49	4.74	4.99	5.02	4.97	4.67	4.14	3.10	2.45	1477.0	4.0
45.0	2.73	3.30	3.94	4.39	4.58	4.79	4.84	4.85	4.63	4.17	3.17	2.51	1458.2	4.0
50.0	2.77	3.30	3.89	4.25	4.39	4.57	4.64	4.70	4.57	4.19	3.22	2.56	1431.4	3.9
60.0	2.79	3.24	3.71	3.92	3.95	4.06	4.16	4.33	4.36	4.13	3.25	2.60	1354.6	3.7
70.0	2.74	3.11	3.45	3.52	3.43	3.48	3.61	3.88	4.06	3.98	3.21	2.58	1249.0	3.4
80.0	2.63	2.91	3.12	3.05	2.89	2.90	3.02	3.35	3.67	3.73	3.08	2.50	1120.9	3.1
90.0	2.45	2.64	2.73	2.53	2.32	2.29	2.42	2.76	3.20	3.40	2.88	2.36	972.9	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PITTSBURGH PA  
LATITUDE: 40 DEGREES 30 MINUTES

APRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.34	1.97	2.97	4.15	5.05	5.56	5.33	4.76	3.80	2.82	1.59	1.10	1232.7	3.4
10.0	1.52	2.16	3.16	4.28	5.10	5.56	5.38	4.92	4.10	3.20	1.86	1.35	1297.8	3.6
15.0	1.60	2.24	3.23	4.31	5.08	5.52	5.36	4.97	4.21	3.36	1.98	1.47	1320.2	3.6
20.0	1.68	2.30	3.28	4.32	5.03	5.44	5.31	4.98	4.30	3.50	2.10	1.57	1335.5	3.7
25.0	1.74	2.36	3.32	4.30	4.96	5.35	5.24	4.97	4.36	3.63	2.19	1.67	1343.6	3.7
30.0	1.80	2.40	3.34	4.27	4.87	5.22	5.13	4.93	4.40	3.73	2.28	1.76	1344.4	3.7
35.0	1.84	2.43	3.34	4.21	4.74	5.06	5.00	4.86	4.42	3.81	2.35	1.84	1337.9	3.7
40.0	1.88	2.45	3.33	4.13	4.60	4.88	4.84	4.77	4.41	3.86	2.41	1.90	1324.1	3.6
45.0	1.91	2.45	3.30	4.03	4.44	4.69	4.67	4.66	4.37	3.90	2.46	1.96	1304.6	3.6
50.0	1.92	2.44	3.24	3.91	4.26	4.48	4.48	4.52	4.31	3.91	2.49	2.00	1278.3	3.5
60.0	1.92	2.38	3.09	3.61	3.84	3.99	4.03	4.17	4.12	3.86	2.51	2.04	1205.5	3.3
70.0	1.87	2.28	2.88	3.25	3.35	3.43	3.51	3.74	3.84	3.72	2.46	2.04	1107.9	3.0
80.0	1.79	2.13	2.61	2.83	2.82	2.87	2.95	3.24	3.48	3.49	2.36	1.98	991.1	2.7
90.0	1.66	1.93	2.29	2.36	2.29	2.27	2.37	2.69	3.04	3.18	2.21	1.87	857.7	2.3

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: WILKES-BARRE-SCRANPA

LATITUDE: 41 DEGREES 20 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.44	2.17	3.12	4.22	5.01	5.55	5.50	4.77	3.77	2.83	1.55	1.16	1252.4	3.4
10.0	1.67	2.41	3.34	4.36	5.06	5.55	5.56	4.95	4.07	3.22	1.82	1.38	1322.6	3.6
15.0	1.78	2.51	3.42	4.39	5.05	5.52	5.55	5.00	4.19	3.39	1.95	1.48	1347.3	3.7
20.0	1.87	2.60	3.48	4.41	5.01	5.45	5.50	5.01	4.28	3.54	2.06	1.57	1364.7	3.7
25.0	1.96	2.68	3.53	4.40	4.94	5.35	5.43	5.01	4.35	3.67	2.16	1.65	1374.7	3.8
30.0	2.03	2.74	3.56	4.36	4.85	5.23	5.33	4.97	4.40	3.78	2.25	1.72	1377.2	3.8
35.0	2.10	2.78	3.57	4.30	4.73	5.08	5.19	4.91	4.42	3.87	2.33	1.78	1372.2	3.8
40.0	2.15	2.81	3.56	4.23	4.59	4.90	5.03	4.82	4.41	3.93	2.39	1.83	1359.8	3.7
45.0	2.18	2.83	3.53	4.13	4.43	4.71	4.86	4.71	4.38	3.97	2.44	1.87	1341.1	3.7
50.0	2.21	2.83	3.48	4.01	4.26	4.50	4.66	4.57	4.33	3.99	2.47	1.91	1315.5	3.6
60.0	2.22	2.78	3.32	3.71	3.84	4.02	4.20	4.23	4.14	3.95	2.49	1.93	1243.6	3.4
70.0	2.19	2.67	3.10	3.34	3.36	3.47	3.66	3.80	3.87	3.81	2.46	1.91	1145.8	3.1
80.0	2.10	2.50	2.82	2.91	2.84	2.90	3.08	3.30	3.51	3.59	2.36	1.85	1027.3	2.8
90.0	1.96	2.28	2.48	2.44	2.31	2.31	2.48	2.74	3.08	3.28	2.21	1.74	891.6	2.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PROVIDENCE  
RI  
LATITUDE: 41 DEGREES 44 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.60	2.33	3.25	4.34	5.22	5.59	5.34	4.72	3.81	2.86	1.70	1.32	1282.0	3.5
10.0	1.90	2.61	3.49	4.49	5.28	5.61	5.40	4.90	4.12	3.26	2.03	1.61	1361.6	3.7
15.0	2.03	2.73	3.58	4.53	5.27	5.57	5.39	4.95	4.24	3.44	2.18	1.74	1390.6	3.8
20.0	2.16	2.83	3.66	4.54	5.23	5.50	5.35	4.97	4.34	3.60	2.32	1.87	1412.0	3.9
25.0	2.27	2.93	3.71	4.54	5.16	5.41	5.28	4.96	4.41	3.73	2.45	1.98	1425.7	3.9
30.0	2.36	3.00	3.74	4.50	5.07	5.29	5.18	4.93	4.46	3.85	2.56	2.08	1431.5	3.9
35.0	2.45	3.06	3.76	4.45	4.94	5.13	5.05	4.87	4.48	3.94	2.66	2.17	1429.4	3.9
40.0	2.52	3.10	3.75	4.37	4.80	4.96	4.90	4.78	4.48	4.01	2.74	2.24	1419.4	3.9
45.0	2.57	3.12	3.72	4.26	4.63	4.77	4.73	4.67	4.45	4.05	2.80	2.30	1402.7	3.8
50.0	2.61	3.12	3.67	4.14	4.45	4.56	4.54	4.54	4.39	4.07	2.84	2.35	1378.8	3.8
60.0	2.64	3.08	3.52	3.84	4.02	4.07	4.10	4.20	4.21	4.03	2.88	2.40	1308.8	3.6
70.0	2.61	2.96	3.29	3.46	3.52	3.52	3.58	3.78	3.94	3.90	2.85	2.39	1210.9	3.3
80.0	2.51	2.78	2.99	3.02	2.97	2.95	3.02	3.29	3.57	3.68	2.75	2.32	1090.3	3.0
90.0	2.35	2.54	2.63	2.52	2.41	2.35	2.44	2.74	3.14	3.36	2.58	2.20	950.8	2.6



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CHARLESTON SC  
LATITUDE: 32 DEGREES 54 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.34	3.14	4.21	5.47	5.86	5.81	5.67	5.00	4.39	3.76	2.94	2.27	1548.5	4.2
10.0	2.66	3.44	4.45	5.58	5.84	5.74	5.64	5.10	4.64	4.17	3.42	2.66	1623.7	4.4
15.0	2.80	3.56	4.53	5.59	5.78	5.66	5.59	5.10	4.73	4.34	3.63	2.84	1648.0	4.5
20.0	2.93	3.66	4.59	5.57	5.69	5.54	5.50	5.08	4.79	4.48	3.82	2.99	1663.2	4.6
25.0	3.04	3.74	4.62	5.52	5.56	5.40	5.38	5.03	4.82	4.60	3.98	3.13	1669.1	4.6
30.0	3.13	3.80	4.63	5.44	5.41	5.23	5.24	4.96	4.83	4.69	4.12	3.26	1665.7	4.6
35.0	3.20	3.84	4.61	5.33	5.24	5.04	5.07	4.86	4.81	4.76	4.24	3.36	1653.7	4.5
40.0	3.25	3.86	4.56	5.19	5.04	4.83	4.88	4.73	4.76	4.79	4.33	3.44	1633.3	4.5
45.0	3.29	3.85	4.49	5.03	4.82	4.60	4.67	4.59	4.69	4.80	4.39	3.50	1603.9	4.4
50.0	3.31	3.83	4.40	4.83	4.58	4.35	4.43	4.41	4.59	4.78	4.43	3.54	1565.7	4.3
60.0	3.28	3.71	4.14	4.38	4.02	3.78	3.90	4.00	4.31	4.65	4.42	3.56	1464.2	4.0
70.0	3.17	3.51	3.79	3.84	3.41	3.18	3.31	3.51	3.94	4.41	4.30	3.48	1333.4	3.7
80.0	3.00	3.23	3.36	3.22	2.78	2.56	2.70	2.96	3.50	4.07	4.07	3.33	1178.9	3.2
90.0	2.75	2.88	2.87	2.58	2.14	1.98	2.10	2.39	2.98	3.63	3.75	3.09	1007.6	2.8

AVERA' . DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: COLUMBIA SC  
LATITUDE: 33 DEGREES 57 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.39	3.22	4.27	5.50	5.97	6.14	5.80	5.37	4.53	3.82	2.90	2.28	1589.4	4.4
10.0	2.75	3.55	4.52	5.63	5.96	6.07	5.79	5.49	4.81	4.27	3.40	2.70	1672.7	4.6
15.0	2.91	3.68	4.61	5.65	5.91	5.99	5.74	5.51	4.91	4.45	3.62	2.88	1700.5	4.7
20.0	3.05	3.79	4.68	5.63	5.82	5.88	5.65	5.49	4.98	4.61	3.81	3.06	1718.7	4.7
25.0	3.17	3.89	4.72	5.59	5.70	5.73	5.54	5.45	5.03	4.75	3.99	3.21	1727.3	4.7
30.0	3.28	3.96	4.73	5.51	5.55	5.55	5.39	5.37	5.04	4.85	4.14	3.34	1726.1	4.7
35.0	3.36	4.00	4.72	5.40	5.37	5.35	5.22	5.27	5.03	4.93	4.27	3.46	1715.5	4.7
40.0	3.43	4.03	4.68	5.27	5.18	5.13	5.03	5.14	4.99	4.97	4.36	3.55	1696.5	4.6
45.0	3.47	4.03	4.51	5.11	4.96	4.88	4.82	4.98	4.92	4.99	4.44	3.62	1668.0	4.6
50.0	3.49	4.01	4.52	4.92	4.71	4.62	4.58	4.80	4.82	4.97	4.48	3.67	1630.2	4.5
60.0	3.48	3.90	4.26	4.47	4.15	4.01	4.03	4.36	4.54	4.85	4.48	3.69	1528.0	4.2
70.0	3.38	3.70	3.91	3.93	3.52	3.37	3.42	3.83	4.17	4.62	4.37	3.63	1394.2	3.8
80.0	3.20	3.41	3.48	3.31	2.87	2.71	2.80	3.23	3.70	4.27	4.15	3.48	1235.4	3.4
90.0	2.95	3.06	2.98	2.66	2.22	2.08	2.17	2.60	3.16	3.83	3.83	3.24	1057.4	2.9

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: GREENVILLE-SPARTANSC  
 LATITUDE: 34 DEGREES 54 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.29	3.10	4.19	5.36	5.79	6.04	5.77	5.36	4.42	3.72	2.77	2.12	1550.8	4.2
10.0	2.65	3.42	4.45	5.49	5.79	5.99	5.77	5.49	4.70	4.17	3.26	2.51	1634.4	4.5
15.0	2.80	3.56	4.54	5.51	5.74	5.92	5.72	5.51	4.81	4.35	3.48	2.69	1662.8	4.6
20.0	2.94	3.67	4.61	5.50	5.66	5.81	5.64	5.50	4.88	4.52	3.67	2.85	1681.8	4.6
25.0	3.06	3.76	4.65	5.46	5.55	5.67	5.53	5.46	4.93	4.65	3.85	3.00	1691.4	4.6
30.0	3.17	3.83	4.67	5.39	5.41	5.50	5.39	5.39	4.95	4.76	4.00	3.13	1691.5	4.6
35.0	3.25	3.88	4.66	5.29	5.24	5.30	5.22	5.29	4.94	4.84	4.12	3.23	1682.1	4.6
40.0	3.32	3.91	4.62	5.16	5.06	5.09	5.04	5.17	4.90	4.89	4.22	3.32	1664.8	4.6
45.0	3.37	3.91	4.56	5.01	4.85	4.86	4.83	5.01	4.84	4.91	4.30	3.39	1638.1	4.5
50.0	3.39	3.90	4.48	4.83	4.62	4.60	4.59	4.83	4.74	4.90	4.34	3.44	1602.4	4.4
60.0	3.38	3.79	4.23	4.40	4.09	4.01	4.06	4.40	4.48	4.79	4.35	3.47	1504.8	4.1
70.0	3.30	3.61	3.89	3.88	3.48	3.39	3.46	3.88	4.12	4.57	4.26	3.41	1375.6	3.8
80.0	3.13	3.34	3.47	3.29	2.87	2.74	2.85	3.28	3.67	4.24	4.05	3.28	1222.3	3.3
90.0	2.89	3.00	2.99	2.66	2.23	2.12	2.21	2.65	3.15	3.81	3.75	3.06	1048.8	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: HURON SD  
LATITUDE: 44 DEGREES 23 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.54	2.35	3.50	4.82	5.90	6.63	6.89	5.97	4.47	3.12	1.82	1.28	1471.9	4.0
10.0	1.89	2.68	3.82	5.03	6.01	6.68	7.02	6.28	4.93	3.67	2.28	1.62	1582.1	4.3
15.0	2.04	2.83	3.94	5.10	6.01	6.65	7.03	6.38	5.12	3.92	2.49	1.78	1624.1	4.4
20.0	2.19	2.96	4.05	5.14	5.98	6.58	7.00	6.44	5.28	4.14	2.68	1.93	1656.9	4.5
25.0	2.32	3.08	4.13	5.14	5.92	6.49	6.93	6.46	5.41	4.34	2.86	2.06	1680.1	4.6
30.0	2.44	3.17	4.18	5.12	5.82	6.35	6.82	6.45	5.31	4.50	3.02	2.19	1693.5	4.6
35.0	2.55	3.25	4.22	5.07	5.70	6.18	6.66	6.40	5.37	4.65	3.16	2.30	1697.0	4.6
40.0	2.63	3.31	4.23	5.00	5.54	5.98	6.47	6.31	5.60	4.76	3.28	2.39	1690.6	4.6
45.0	2.71	3.35	4.21	4.89	5.35	5.74	6.25	6.18	5.59	4.84	3.38	2.47	1674.6	4.6
50.0	2.76	3.37	4.17	4.77	5.15	5.50	6.01	6.03	5.55	4.89	3.46	2.54	1650.9	4.5
60.0	2.82	3.34	4.03	4.44	4.68	4.93	5.43	5.61	5.37	4.90	3.55	2.62	1575.1	4.3
70.0	2.81	3.24	3.77	4.02	4.10	4.26	4.74	5.07	5.06	4.78	3.55	2.64	1463.3	4.0
80.0	2.72	3.07	3.47	3.53	3.46	3.55	3.96	4.42	4.63	4.55	3.45	2.58	1320.5	3.6
90.0	2.57	2.82	3.07	2.96	2.82	2.82	3.17	3.68	4.09	4.19	3.27	2.46	1154.4	3.2

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PIERRE SD  
LATITUDE: 44 DEGREES 23 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.67	2.51	3.80	5.09	6.19	6.92	7.18	6.29	4.72	3.31	1.96	1.39	1555.8	4.3
10.0	2.07	2.88	4.16	5.32	6.31	6.97	7.32	6.63	5.23	3.93	2.49	1.79	1679.3	4.6
15.0	2.25	3.05	4.30	5.39	6.31	6.94	7.34	6.74	5.44	4.20	2.73	1.98	1726.9	4.7
20.0	2.41	3.19	4.42	5.43	6.28	6.88	7.30	6.81	5.62	4.45	2.95	2.15	1764.5	4.8
25.0	2.57	3.32	4.52	5.45	6.22	6.78	7.23	6.84	5.76	4.66	3.15	2.31	1791.8	4.9
30.0	2.70	3.43	4.58	5.43	6.12	6.63	7.11	6.83	5.87	4.85	3.34	2.45	1808.4	5.0
35.0	2.83	3.52	4.62	5.38	5.99	6.46	6.95	6.78	5.94	5.01	3.50	2.58	1814.3	5.0
40.0	2.93	3.59	4.54	5.30	5.82	6.24	6.76	6.68	5.98	5.14	3.64	2.69	1809.5	5.0
45.0	3.01	3.63	4.63	5.19	5.62	5.99	6.52	6.55	5.97	5.23	3.76	2.79	1794.2	4.9
50.0	3.08	3.66	4.59	5.06	5.41	5.74	6.27	6.39	5.93	5.29	3.85	2.87	1770.4	4.9
60.0	3.15	3.64	4.43	4.71	4.90	5.13	5.66	5.95	5.75	5.31	3.96	2.96	1691.8	4.6
70.0	3.14	3.54	4.17	4.26	4.30	4.43	4.93	5.37	5.42	5.19	3.96	2.99	1573.9	4.3
80.0	3.05	3.35	3.82	3.73	3.61	3.68	4.11	4.67	4.96	4.94	3.86	2.93	1421.7	3.9
90.0	2.89	3.08	3.38	3.13	2.93	2.91	3.28	3.88	4.38	4.56	3.66	2.80	1243.7	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: RAPID CITY SD  
 LATITUDE: 44 DEGREES 3 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.71	2.60	3.87	5.01	5.95	6.72	7.00	6.18	4.78	3.35	2.04	1.50	1546.3	4.2
10.0	2.11	3.00	4.23	5.23	6.05	6.77	7.14	6.51	5.30	3.96	2.58	1.94	1670.7	4.6
15.0	2.30	3.17	4.38	5.30	6.06	6.74	7.15	6.62	5.51	4.24	2.83	2.14	1718.8	4.7
20.0	2.47	3.32	4.50	5.34	6.02	6.67	7.11	6.68	5.69	4.48	3.06	2.32	1757.1	4.8
25.0	2.62	3.45	4.59	5.35	5.96	6.57	7.04	6.71	5.83	4.70	3.28	2.50	1785.0	4.9
30.0	2.76	3.57	4.66	5.33	5.86	6.43	6.92	6.69	5.94	4.89	3.47	2.66	1802.4	4.9
35.0	2.88	3.66	4.70	5.28	5.73	6.26	6.76	6.64	6.01	5.05	3.64	2.80	1809.2	5.0
40.0	2.99	3.73	4.71	5.19	5.57	6.05	6.57	6.54	6.04	5.17	3.78	2.92	1805.2	4.9
45.0	3.07	3.78	4.70	5.09	5.38	5.81	6.34	6.41	6.04	5.26	3.90	3.03	1790.9	4.9
50.0	3.14	3.80	4.66	4.95	5.18	5.56	6.09	6.25	6.00	5.32	4.00	3.11	1768.0	4.8
60.0	3.21	3.78	4.50	4.61	4.69	4.97	5.50	5.81	5.80	5.34	4.11	3.22	1691.2	4.6
70.0	3.20	3.67	4.23	4.17	4.12	4.29	4.79	5.24	5.47	5.21	4.11	3.24	1575.2	4.3
80.0	3.11	3.48	3.87	3.65	3.47	3.57	3.99	4.56	5.00	4.95	4.01	3.18	1425.0	3.9
90.0	2.93	3.20	3.42	3.06	2.82	2.82	3.19	3.78	4.41	4.57	3.80	3.04	1248.5	3.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SIOUX FALLS SD  
LATITUDE: 43 DEGREES 34 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.68	2.53	3.63	4.86	5.97	6.62	6.77	5.82	4.44	3.17	1.92	1.39	1487.2	4.1
10.0	2.06	2.89	3.95	5.07	6.07	6.66	6.89	6.10	4.89	3.71	2.39	1.76	1597.4	4.4
15.0	2.23	3.05	4.07	5.13	6.07	6.62	6.90	6.19	5.07	3.95	2.60	1.93	1639.2	4.5
20.0	2.39	3.19	4.18	5.16	6.03	6.56	6.86	6.24	5.22	4.17	2.80	2.09	1671.8	4.6
25.0	2.53	3.31	4.26	5.16	5.96	6.45	6.78	6.26	5.33	4.36	2.98	2.24	1694.6	4.6
30.0	2.66	3.42	4.31	5.14	5.86	6.31	6.67	6.24	5.42	4.52	3.14	2.37	1707.6	4.7
35.0	2.77	3.50	4.35	5.09	5.73	6.14	6.51	6.18	5.47	4.66	3.28	2.49	1710.7	4.7
40.0	2.87	3.56	4.35	5.00	5.57	5.93	6.32	6.09	5.50	4.76	3.41	2.59	1703.8	4.7
45.0	2.94	3.60	4.34	4.90	5.38	5.70	6.10	5.96	5.48	4.84	3.51	2.67	1687.6	4.6
50.0	3.00	3.62	4.29	4.77	5.17	5.45	5.86	5.80	5.44	4.89	3.58	2.74	1663.2	4.6
60.0	3.06	3.60	4.13	4.43	4.68	4.87	5.29	5.39	5.25	4.88	3.67	2.83	1585.9	4.3
70.0	3.05	3.49	3.88	4.01	4.10	4.20	4.60	4.86	4.93	4.76	3.66	2.84	1472.5	4.0
80.0	2.95	3.29	3.55	3.50	3.45	3.49	3.84	4.23	4.50	4.51	3.56	2.78	1328.3	3.6
90.0	2.79	3.02	3.13	2.94	2.79	2.76	3.07	3.51	3.97	4.15	3.36	2.65	1160.4	3.2

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CHATTANOOGA IN  
LATITUDE: 35 DEGREES 2 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.98	2.71	3.70	4.89	5.45	5.78	5.46	5.14	4.21	3.50	2.43	1.83	1433.7	3.9
10.0	2.25	2.97	3.91	5.00	5.45	5.73	5.46	5.26	4.47	3.90	2.82	2.14	1503.5	4.1
15.0	2.37	3.07	3.99	5.02	5.40	5.66	5.42	5.28	4.56	4.07	3.00	2.28	1526.3	4.2
20.0	2.48	3.16	4.04	5.01	5.33	5.56	5.34	5.27	4.63	4.21	3.15	2.41	1540.7	4.2
25.0	2.57	3.23	4.07	4.97	5.23	5.43	5.24	5.23	4.67	4.33	3.29	2.52	1546.6	4.2
30.0	2.65	3.28	4.08	4.90	5.10	5.27	5.11	5.17	4.69	4.43	3.41	2.62	1544.1	4.2
35.0	2.72	3.32	4.07	4.81	4.94	5.08	4.95	5.07	4.68	4.50	3.51	2.70	1533.0	4.2
40.0	2.76	3.34	4.04	4.70	4.77	4.88	4.78	4.95	4.64	4.54	3.59	2.77	1515.1	4.2
45.0	2.80	3.33	3.98	4.56	4.58	4.66	4.59	4.81	4.58	4.55	3.64	2.82	1488.8	4.1
50.0	2.81	3.31	3.90	4.40	4.36	4.42	4.37	4.64	4.49	4.54	3.68	2.85	1454.5	4.0
60.0	2.80	3.22	3.69	4.02	3.87	3.87	3.87	4.22	4.24	4.44	3.68	2.87	1362.9	3.7
70.0	2.72	3.05	3.39	3.55	3.31	3.28	3.31	3.73	3.90	4.23	3.59	2.82	1243.6	3.4
80.0	2.57	2.82	3.03	3.02	2.74	2.67	2.73	3.17	3.48	3.92	3.41	2.70	1103.4	3.0
90.0	2.37	2.54	2.62	2.46	2.15	2.08	2.14	2.57	2.99	3.53	3.15	2.51	945.9	2.6



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: KNOXVILLE  
TN  
LATITUDE: 35 DEGREES 49 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.95	2.73	3.75	5.05	5.68	5.99	5.68	5.25	4.36	3.53	2.39	1.80	1466.8	4.0
10.0	2.23	3.00	3.98	5.17	5.68	5.95	5.69	5.39	4.64	3.96	2.79	2.12	1541.3	4.2
15.0	2.36	3.11	4.06	5.20	5.64	5.88	5.64	5.42	4.75	4.14	2.97	2.26	1566.0	4.3
20.0	2.47	3.20	4.12	5.19	5.57	5.78	5.57	5.41	4.83	4.30	3.13	2.39	1582.1	4.3
25.0	2.56	3.28	4.16	5.15	5.47	5.65	5.47	5.38	4.88	4.43	3.27	2.50	1589.4	4.4
30.0	2.65	3.34	4.17	5.09	5.33	5.48	5.33	5.31	4.90	4.53	3.40	2.61	1587.9	4.4
35.0	2.71	3.38	4.16	5.00	5.17	5.29	5.17	5.22	4.90	4.61	3.50	2.69	1577.5	4.3
40.0	2.77	3.40	4.13	4.89	5.00	5.09	4.99	5.10	4.87	4.66	3.58	2.76	1559.8	4.3
45.0	2.80	3.40	4.08	4.75	4.80	4.86	4.79	4.95	4.81	4.68	3.64	2.82	1533.7	4.2
50.0	2.82	3.39	4.00	4.58	4.57	4.61	4.57	4.78	4.72	4.68	3.68	2.86	1499.2	4.1
60.0	2.81	3.30	3.79	4.19	4.06	4.04	4.05	4.36	4.47	4.58	3.69	2.88	1406.2	3.9
70.0	2.74	3.13	3.49	3.71	3.47	3.42	3.46	3.86	4.12	4.37	3.61	2.83	1284.1	3.5
80.0	2.60	2.90	3.13	3.16	2.88	2.78	2.86	3.28	3.68	4.06	3.43	2.72	1140.2	3.1
90.0	2.40	2.61	2.70	2.57	2.25	2.16	2.24	2.66	3.17	3.66	3.18	2.54	977.5	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MEMPHIS  
LATITUDE: 35 DEGREES 3 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.15	2.98	4.02	5.17	5.94	6.44	6.21	5.75	4.63	3.80	2.57	1.98	1573.1	4.3
10.0	2.47	3.28	4.27	5.29	5.94	6.39	6.21	5.91	4.94	4.26	3.00	2.34	1653.9	4.5
15.0	2.61	3.41	4.35	5.31	5.89	6.30	6.16	5.94	5.05	4.46	3.19	2.50	1680.5	4.6
20.0	2.73	3.52	4.42	5.30	5.81	6.19	6.07	5.93	5.14	4.63	3.37	2.65	1697.7	4.7
25.0	2.84	3.60	4.46	5.26	5.70	6.04	5.95	5.89	5.19	4.77	3.52	2.78	1705.4	4.7
30.0	2.94	3.67	4.47	5.19	5.55	5.85	5.80	5.81	5.22	4.89	3.65	2.90	1703.4	4.7
35.0	3.01	3.71	4.46	5.10	5.38	5.64	5.62	5.71	5.21	4.97	3.76	2.99	1691.7	4.6
40.0	3.07	3.74	4.43	4.98	5.19	5.41	5.42	5.57	5.18	5.02	3.84	3.07	1672.3	4.6
45.0	3.11	3.74	4.37	4.83	4.98	5.16	5.19	5.41	5.11	5.05	3.91	3.13	1643.5	4.5
50.0	3.13	3.72	4.29	4.66	4.74	4.88	4.93	5.21	5.01	5.04	3.95	3.18	1605.5	4.4
60.0	3.12	3.63	4.05	4.25	4.19	4.25	4.35	4.74	4.74	4.93	3.95	3.20	1503.3	4.1
70.0	3.04	3.44	3.73	3.75	3.56	3.56	3.68	4.17	4.36	4.71	3.86	3.15	1369.6	3.8
80.0	2.88	3.19	3.33	3.19	2.93	2.87	3.01	3.52	3.88	4.37	3.67	3.02	1212.3	3.3
90.0	2.66	2.86	2.87	2.59	2.27	2.19	2.32	2.82	3.33	3.93	3.39	2.82	1035.3	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: NASHVILLE TN  
 LATITUDE: 36 DEGREES 7 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.82	2.60	3.56	4.87	5.74	6.18	5.96	5.48	4.40	3.52	2.24	1.64	1463.1	4.0
10.0	2.07	2.85	3.77	5.00	5.76	6.14	5.98	5.63	4.70	3.95	2.61	1.92	1534.4	4.2
15.0	2.18	2.96	3.84	5.02	5.71	6.07	5.93	5.66	4.81	4.13	2.77	2.04	1557.5	4.3
20.0	2.28	3.04	3.90	5.01	5.64	5.97	5.86	5.66	4.89	4.29	2.92	2.15	1572.1	4.3
25.0	2.37	3.11	3.93	4.98	5.54	5.83	5.75	5.63	4.95	4.42	3.05	2.25	1577.9	4.3
30.0	2.44	3.17	3.94	4.92	5.41	5.66	5.61	5.56	4.97	4.53	3.16	2.34	1574.9	4.3
35.0	2.50	3.21	3.94	4.83	5.25	5.46	5.44	5.47	4.97	4.61	3.26	2.41	1563.2	4.3
40.0	2.54	3.22	3.91	4.72	5.07	5.25	5.25	5.34	4.94	4.66	3.33	2.47	1544.2	4.2
45.0	2.57	3.23	3.85	4.59	4.87	5.02	5.04	5.19	4.88	4.68	3.39	2.52	1517.0	4.2
50.0	2.59	3.21	3.78	4.44	4.64	4.75	4.80	5.01	4.80	4.68	3.42	2.55	1481.5	4.1
60.0	2.58	3.12	3.58	4.06	4.12	4.16	4.25	4.57	4.54	4.58	3.42	2.56	1386.8	3.8
70.0	2.50	2.97	3.30	3.60	3.52	3.52	3.62	4.04	4.19	4.38	3.35	2.52	1263.5	3.5
80.0	2.38	2.75	2.96	3.07	2.92	2.86	2.99	3.43	3.75	4.07	3.19	2.41	1119.0	3.1
90.0	2.20	2.48	2.56	2.51	2.28	2.21	2.32	2.78	3.23	3.67	2.95	2.25	956.3	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M.)

SITE: ABILENE  
TX  
LATITUDE: 32 DEGREES 26 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.91	3.74	4.96	5.81	6.42	6.96	6.74	6.17	5.03	4.15	3.17	2.72	1790.0	4.9
10.0	3.35	4.12	5.27	5.93	6.39	6.87	6.71	6.31	5.34	4.62	3.70	3.24	1883.2	5.2
15.0	3.55	4.28	5.38	5.94	6.33	6.76	6.63	6.32	5.45	4.82	3.93	3.47	1913.8	5.2
20.0	3.73	4.41	5.46	5.92	6.22	6.61	6.52	6.30	5.53	4.99	4.14	3.68	1933.3	5.3
25.0	3.88	4.52	5.50	5.86	6.08	6.43	6.37	6.24	5.57	5.13	4.32	3.87	1941.6	5.3
30.0	4.01	4.60	5.52	5.77	5.91	6.21	6.19	6.15	5.59	5.24	4.48	4.03	1938.6	5.3
35.0	4.12	4.66	5.50	5.66	5.71	5.97	5.98	6.02	5.57	5.31	4.61	4.17	1925.3	5.3
40.0	4.20	4.69	5.45	5.51	5.49	5.70	5.74	5.86	5.52	5.36	4.71	4.28	1901.8	5.2
45.0	4.25	4.69	5.37	5.33	5.24	5.40	5.47	5.67	5.43	5.37	4.78	4.37	1867.3	5.1
50.0	4.28	4.66	5.26	5.12	4.96	5.08	5.18	5.44	5.32	5.35	4.82	4.43	1822.2	5.0
60.0	4.26	4.52	4.94	4.63	4.33	4.36	4.50	4.91	5.00	5.20	4.81	4.46	1701.2	4.7
70.0	4.14	4.28	4.52	4.04	3.64	3.60	3.77	4.27	4.56	4.94	4.68	4.37	1545.1	4.2
80.0	3.91	3.94	4.00	3.37	2.93	2.82	3.01	3.55	4.03	4.55	4.43	4.18	1359.8	3.7
90.0	3.59	3.51	3.39	2.68	2.22	2.10	2.26	2.80	3.41	4.06	4.07	3.89	1154.8	3.2

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: AMARILLO TX  
LATITUDE: 35 DEGREES 14 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	3.02	3.92	5.14	6.37	6.97	7.54	7.19	6.63	5.55	4.42	3.25	2.75	1910.7	5.2
10.0	3.59	4.41	5.51	6.56	6.98	7.47	7.19	6.83	5.98	5.03	3.90	3.38	2035.3	5.6
15.0	3.85	4.62	5.65	6.60	6.92	7.38	7.13	6.88	6.14	5.29	4.20	3.67	2079.7	5.7
20.0	4.08	4.80	5.76	6.59	6.83	7.24	7.03	6.88	6.26	5.52	4.46	3.93	2111.7	5.8
25.0	4.29	4.95	5.84	6.55	6.69	7.05	6.89	6.83	6.34	5.71	4.70	4.16	2131.0	5.8
30.0	4.47	5.07	5.87	6.47	6.52	6.83	6.71	6.75	6.39	5.87	4.91	4.38	2137.5	5.9
35.0	4.62	5.15	5.88	6.36	6.31	6.57	6.49	6.63	6.40	5.99	5.09	4.56	2131.2	5.8
40.0	4.74	5.21	5.85	6.21	6.08	6.29	6.25	6.48	6.37	6.07	5.23	4.71	2114.3	5.8
45.0	4.83	5.24	5.78	6.03	5.82	5.98	5.98	6.28	6.30	6.12	5.34	4.83	2084.8	5.7
50.0	4.89	5.23	5.68	5.81	5.52	5.64	5.67	6.05	6.19	6.12	5.41	4.93	2042.8	5.6
60.0	4.92	5.12	5.38	5.28	4.85	4.87	4.97	5.50	5.86	6.02	5.46	5.01	1923.0	5.3
70.0	4.82	4.89	4.95	4.63	4.08	4.03	4.17	4.81	5.39	5.76	5.36	4.96	1759.4	4.8
80.0	4.60	4.53	4.42	3.89	3.31	3.18	3.36	4.03	4.80	5.35	5.12	4.79	1562.0	4.3
90.0	4.26	4.08	3.79	3.10	2.50	2.36	2.52	3.20	4.09	4.81	4.75	4.48	1335.5	3.7

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: AUSTIN TX  
 LATITUDE: 30 DEGREES 18 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.72	3.55	4.50	5.06	5.78	6.53	6.64	6.09	5.06	4.21	3.11	2.60	1700.7	4.7
10.0	3.08	3.87	4.73	5.14	5.73	6.42	6.58	6.19	5.34	4.64	3.56	3.01	1774.8	4.9
15.0	3.23	4.00	4.81	5.13	5.66	6.30	6.49	6.19	5.43	4.82	3.75	3.20	1797.0	4.9
20.0	3.37	4.10	4.86	5.10	5.56	6.16	6.37	6.16	5.49	4.97	3.92	3.36	1809.0	5.0
25.0	3.48	4.19	4.88	5.04	5.43	5.98	6.21	6.09	5.52	5.09	4.07	3.51	1810.8	5.0
30.0	3.58	4.25	4.87	4.95	5.27	5.76	6.02	5.98	5.52	5.18	4.20	3.63	1802.4	4.9
35.0	3.66	4.28	4.84	4.84	5.09	5.53	5.80	5.84	5.49	5.24	4.30	3.74	1785.2	4.9
40.0	3.71	4.29	4.78	4.70	4.88	5.27	5.56	5.68	5.43	5.27	4.37	3.82	1758.1	4.8
45.0	3.74	4.28	4.70	4.54	4.66	4.99	5.28	5.48	5.33	5.27	4.42	3.88	1721.2	4.7
50.0	3.75	4.24	4.59	4.36	4.40	4.68	4.98	5.25	5.20	5.23	4.44	3.91	1674.6	4.6
60.0	3.71	4.09	4.29	3.93	3.84	4.00	4.30	4.70	4.86	5.06	4.40	3.90	1554.4	4.3
76.0	3.57	3.85	3.90	3.43	3.23	3.30	3.58	4.06	4.42	4.78	4.25	3.80	1404.5	3.8
80.0	3.36	3.52	3.44	2.86	2.61	2.57	2.83	3.35	3.88	4.38	4.00	3.61	1228.4	3.4
90.0	3.06	3.12	2.91	2.29	2.00	1.93	2.11	2.62	3.26	3.88	3.65	3.33	1038.4	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BROWNSVILLE TX  
LATITUDE: 25 DEGREES 54 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.88	3.59	4.59	5.48	6.08	6.67	6.98	6.39	5.34	4.55	3.32	2.72	1784.1	4.9
10.0	3.19	3.85	4.77	5.52	5.97	6.49	6.85	6.44	5.57	4.95	3.72	3.07	1839.5	5.0
15.0	3.32	3.95	4.83	5.49	5.87	6.35	6.73	6.41	5.64	5.10	3.89	3.22	1851.8	5.1
20.0	3.43	4.03	4.85	5.43	5.74	6.17	6.57	6.35	5.68	5.23	4.04	3.35	1853.6	5.1
25.0	3.53	4.09	4.85	5.35	5.58	5.96	6.37	6.24	5.69	5.33	4.16	3.46	1845.0	5.1
30.0	3.60	4.12	4.83	5.23	5.39	5.72	6.14	6.11	5.66	5.40	4.26	3.56	1827.1	5.0
35.0	3.65	4.13	4.77	5.09	5.18	5.46	5.89	5.94	5.60	5.43	4.33	3.63	1799.3	4.9
40.0	3.69	4.12	4.69	4.93	4.94	5.17	5.60	5.73	5.51	5.43	4.38	3.68	1761.3	4.8
45.0	3.70	4.08	4.59	4.73	4.67	4.85	5.28	5.50	5.38	5.40	4.40	3.71	1713.7	4.7
50.0	3.69	4.03	4.46	4.52	4.39	4.51	4.93	5.23	5.23	5.34	4.40	3.72	1656.6	4.5
60.0	3.61	3.85	4.13	4.01	3.75	3.79	4.17	4.62	4.83	5.12	4.31	3.67	1516.9	4.2
70.0	3.44	3.58	3.71	3.44	3.10	3.05	3.39	3.92	4.33	4.78	4.13	3.53	1350.6	3.7
80.0	3.20	3.24	3.23	2.82	2.42	2.32	2.57	3.16	3.74	4.33	3.84	3.32	1161.2	3.2
90.0	2.89	2.84	2.69	2.18	1.81	1.73	1.86	2.38	3.08	3.78	3.47	3.02	965.0	2.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CORPUS CHRISTI TX  
 LATITUDE: 27 DEGREES 46 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.83	3.62	4.50	5.18	5.88	6.60	6.89	6.28	5.31	4.47	3.28	2.66	1751.5	4.8
10.0	3.16	3.91	4.70	5.23	5.81	6.45	6.80	6.35	5.57	4.90	3.72	3.03	1815.8	5.0
15.0	3.30	4.02	4.76	5.22	5.72	6.32	6.69	6.34	5.65	5.07	3.90	3.19	1832.7	5.0
20.0	3.43	4.12	4.79	5.17	5.60	6.15	6.54	6.28	5.71	5.21	4.06	3.34	1839.3	5.0
25.0	3.53	4.19	4.80	5.10	5.46	5.95	6.36	6.20	5.72	5.33	4.20	3.46	1835.5	5.0
30.0	3.61	4.23	4.78	5.00	5.28	5.73	6.14	6.07	5.71	5.41	4.31	3.57	1821.9	5.0
35.0	3.68	4.25	4.74	4.88	5.09	5.48	5.90	5.92	5.66	5.45	4.40	3.65	1798.9	4.9
40.0	3.72	4.25	4.67	4.73	4.87	5.21	5.63	5.73	5.58	5.47	4.46	3.71	1765.9	4.8
45.0	3.74	4.22	4.57	4.55	4.62	4.91	5.33	5.51	5.46	5.45	4.50	3.75	1723.0	4.7
50.0	3.74	4.17	4.45	4.36	4.36	4.58	5.00	5.26	5.32	5.40	4.50	3.77	1670.5	4.6
60.0	3.67	4.00	4.14	3.90	3.76	3.87	4.26	4.67	4.94	5.20	4.44	3.74	1539.2	4.2
70.0	3.52	3.75	3.74	3.37	3.14	3.16	3.50	3.99	4.45	4.87	4.26	3.62	1379.9	3.8
80.0	3.29	3.41	3.27	2.79	2.48	2.43	2.70	3.25	3.87	4.44	3.99	3.41	1195.6	3.3
90.0	2.98	3.00	2.74	2.20	1.88	1.81	1.96	2.49	3.21	3.90	3.62	3.12	1000.8	2.7



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DALLAS TX  
LATITUDE: 32 DEGREES 51 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.59	3.38	4.47	5.13	5.95	6.73	6.68	6.15	5.00	4.03	2.95	2.46	1690.9	4.6
10.0	2.97	3.71	4.73	5.23	5.93	6.64	6.66	6.29	5.31	4.49	3.42	2.90	1775.2	4.9
15.0	3.14	3.85	4.82	5.24	5.87	6.54	6.59	6.31	5.42	4.68	3.63	3.10	1802.5	4.9
20.0	3.28	3.96	4.89	5.22	5.77	6.40	6.48	6.29	5.50	4.85	3.82	3.28	1819.5	5.0
25.0	3.41	4.06	4.93	5.17	5.65	6.23	6.34	6.23	5.55	4.98	3.99	3.44	1826.0	5.0
30.0	3.52	4.13	4.93	5.09	5.49	6.02	6.15	6.14	5.57	5.09	4.13	3.58	1822.2	5.0
35.0	3.61	4.17	4.92	4.99	5.32	5.79	5.95	6.02	5.55	5.16	4.24	3.70	1808.7	5.0
40.0	3.68	4.19	4.87	4.86	5.12	5.54	5.72	5.86	5.50	5.21	4.33	3.79	1785.9	4.9
45.0	3.72	4.19	4.80	4.71	4.89	5.26	5.45	5.67	5.42	5.22	4.40	3.87	1752.9	4.8
50.0	3.74	4.17	4.70	4.53	4.64	4.95	5.16	5.45	5.31	5.20	4.43	3.91	1710.1	4.7
60.0	3.72	4.04	4.42	4.11	4.07	4.26	4.50	4.92	4.99	5.06	4.42	3.94	1596.2	4.4
70.0	3.61	3.82	4.04	3.61	3.44	3.54	3.77	4.29	4.56	4.81	4.30	3.86	1449.9	4.0
80.0	3.41	3.52	3.59	3.04	2.80	2.79	3.02	3.57	4.04	4.44	4.07	3.69	1277.0	3.5
90.0	3.13	3.15	3.06	2.45	2.16	2.09	2.28	2.82	3.43	3.96	3.75	3.43	1085.7	3.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: DEL RIO  
 LATITUDE: 29 DEGREES 22 MINUTES  
 IX

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.02	3.81	4.97	5.36	5.76	6.38	6.48	6.11	4.99	4.29	3.33	2.84	1746.4	4.8
10.0	3.42	4.15	5.23	5.43	5.71	6.25	6.41	6.20	5.25	4.72	3.82	3.30	1823.7	5.0
15.0	3.60	4.29	5.32	5.42	5.63	6.14	6.32	6.19	5.34	4.90	4.02	3.50	1847.0	5.1
20.0	3.75	4.40	5.37	5.39	5.52	5.99	6.20	6.15	5.39	5.04	4.21	3.68	1859.9	5.1
25.0	3.88	4.49	5.40	5.32	5.39	5.81	6.04	6.07	5.41	5.16	4.37	3.84	1862.2	5.1
30.0	3.99	4.55	5.39	5.22	5.22	5.60	5.85	5.96	5.41	5.25	4.50	3.98	1854.1	5.1
35.0	4.07	4.59	5.35	5.10	5.04	5.37	5.64	5.82	5.37	5.30	4.61	4.09	1836.7	5.0
40.0	4.13	4.60	5.29	4.95	4.84	5.12	5.39	5.65	5.30	5.32	4.69	4.17	1809.0	5.0
45.0	4.17	4.63	5.19	4.78	4.60	4.84	5.12	5.44	5.20	5.31	4.74	4.23	1771.1	4.9
50.0	4.18	4.54	5.06	4.58	4.35	4.53	4.82	5.21	5.07	5.27	4.76	4.27	1723.3	4.7
60.0	4.13	4.37	4.73	4.11	3.78	3.86	4.16	4.65	4.73	5.19	4.71	4.26	1599.6	4.4
70.0	3.97	4.11	4.29	3.56	3.18	3.19	3.45	4.01	4.28	4.80	4.54	4.14	1445.5	4.0
80.0	3.73	3.75	3.76	2.96	2.55	2.48	2.72	3.29	3.75	4.39	4.27	3.93	1263.8	3.5
90.0	3.40	3.32	3.15	2.34	1.95	1.87	2.03	2.56	3.14	3.88	3.89	3.62	1068.2	2.9

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: EL PASO TX  
LATITUDE: 31 DEGREES 48 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.54	4.67	6.02	7.45	8.20	8.46	7.73	7.20	6.26	5.17	3.92	3.25	2187.8	6.0
10.0	4.15	5.22	6.43	7.63	8.15	8.32	7.68	7.37	6.70	5.84	4.65	3.92	2315.1	6.3
15.0	4.42	5.45	6.58	7.65	8.05	8.17	7.59	7.39	6.86	6.12	4.97	4.22	2357.8	6.5
20.0	4.66	5.65	6.69	7.62	7.91	7.98	7.45	7.37	6.97	6.36	5.26	4.49	2386.0	6.5
25.0	4.87	5.81	6.76	7.55	7.71	7.73	7.27	7.30	7.04	6.57	5.52	4.74	2399.6	6.6
30.0	5.05	5.93	6.79	7.43	7.47	7.44	7.05	7.18	7.07	6.73	5.74	4.96	2398.3	6.6
35.0	5.20	6.02	6.77	7.27	7.20	7.12	6.79	7.03	7.06	6.84	5.92	5.14	2383.9	6.5
40.0	5.32	6.07	6.72	7.07	6.89	6.77	6.51	6.83	7.00	6.92	6.07	5.29	2355.8	6.5
45.0	5.40	6.09	6.62	6.83	6.54	6.38	6.18	6.60	6.89	6.94	6.17	5.40	2313.2	6.3
50.0	5.45	6.06	6.48	6.54	6.15	5.96	5.82	6.32	6.75	6.93	6.24	5.48	2256.5	6.2
60.0	5.44	5.90	6.09	5.86	5.28	5.01	5.02	5.67	6.33	6.76	6.24	5.54	2102.5	5.8
70.0	5.29	5.59	5.55	5.05	4.33	4.04	4.13	4.89	5.77	6.42	6.09	5.44	1902.7	5.2
80.0	5.00	5.15	4.89	4.13	3.35	3.03	3.23	4.01	5.07	5.92	5.77	5.21	1663.6	4.6
90.0	4.59	4.58	4.11	3.18	2.40	2.11	2.34	3.09	4.25	5.27	5.30	4.84	1399.4	3.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KMH/SQ. M)

SITE: FORT WORTH TX  
LATITUDE: 32 DEGREES 50 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.53	3.37	4.44	5.10	5.96	6.78	6.80	6.25	5.11	4.08	2.95	2.41	1699.5	4.7
10.0	2.90	3.70	4.69	5.20	5.94	6.70	6.77	6.40	5.43	4.55	3.43	2.85	1783.6	4.9
15.0	3.06	3.84	4.78	5.21	5.88	6.59	6.70	6.42	5.55	4.75	3.64	3.04	1810.6	5.0
20.0	3.20	3.96	4.85	5.19	5.78	6.46	6.59	6.40	5.63	4.92	3.83	3.21	1827.3	5.0
25.0	3.33	4.05	4.88	5.14	5.66	6.28	6.44	6.34	5.68	5.05	4.00	3.37	1833.5	5.0
30.0	3.43	4.12	4.89	5.06	5.50	6.07	6.26	6.25	5.70	5.16	4.14	3.50	1829.3	5.0
35.0	3.52	4.16	4.87	4.96	5.32	5.84	6.04	6.12	5.68	5.24	4.26	3.62	1815.4	5.0
40.0	3.58	4.18	4.83	4.83	5.13	5.58	5.81	5.96	5.63	5.28	4.35	3.71	1792.1	4.9
45.0	3.62	4.18	4.75	4.68	4.90	5.30	5.54	5.77	5.55	5.30	4.41	3.78	1758.6	4.8
50.0	3.64	4.16	4.65	4.50	4.65	4.99	5.24	5.54	5.44	5.28	4.44	3.82	1715.2	4.7
60.0	3.62	4.03	4.32	4.08	4.08	4.29	4.57	5.00	5.11	5.14	4.43	3.84	1600.0	4.4
70.0	3.51	3.81	4.01	3.58	3.45	3.56	3.82	4.36	4.67	4.88	4.31	3.77	1452.3	4.0
80.0	3.32	3.51	3.56	3.02	2.81	2.80	3.06	3.62	4.13	4.51	4.08	3.60	1278.0	3.5
90.0	3.05	3.14	3.03	2.44	2.16	2.10	2.30	2.86	3.50	4.03	3.76	3.34	1085.4	3.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: HOUSTON TX  
LATITUDE: 29 DEGREES 59 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.43	3.26	4.08	4.80	5.60	5.98	5.77	5.32	4.63	4.03	2.91	2.29	1556.4	4.3
10.0	2.72	3.54	4.27	4.87	5.55	5.88	5.71	5.40	4.87	4.42	3.30	2.63	1618.4	4.4
15.0	2.84	3.64	4.34	4.86	5.48	5.78	5.64	5.39	4.94	4.59	3.47	2.77	1636.2	4.5
20.0	2.95	3.73	4.37	4.83	5.38	5.65	5.54	5.36	4.99	4.72	3.62	2.90	1645.1	4.5
25.0	3.04	3.80	4.39	4.77	5.25	5.48	5.40	5.29	5.01	4.83	3.75	3.02	1644.9	4.5
30.0	3.12	3.85	4.38	4.68	5.10	5.29	5.24	5.20	5.01	4.91	3.86	3.11	1635.7	4.5
35.0	3.18	3.87	4.35	4.58	4.92	5.09	5.06	5.08	4.97	4.96	3.95	3.19	1618.7	4.4
40.0	3.22	3.88	4.29	4.45	4.73	4.86	4.85	4.94	4.91	4.98	4.01	3.25	1593.0	4.4
45.0	3.24	3.86	4.21	4.30	4.51	4.60	4.62	4.76	4.82	4.97	4.04	3.29	1558.6	4.3
50.0	3.24	3.82	4.11	4.12	4.26	4.32	4.37	4.57	4.70	4.93	4.06	3.31	1515.8	4.2
60.0	3.19	3.68	3.84	3.72	3.72	3.71	3.81	4.11	4.39	4.77	4.01	3.29	1406.3	3.9
70.0	3.06	3.46	3.49	3.24	3.14	3.09	3.20	3.57	3.99	4.49	3.87	3.20	1271.2	3.5
80.0	2.87	3.15	3.08	2.72	2.53	2.44	2.57	2.97	3.50	4.11	3.63	3.03	1113.3	3.1
90.0	2.62	2.80	2.61	2.18	1.95	1.86	1.97	2.35	2.95	3.65	3.32	2.79	943.6	2.6

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: KINGSVILLE TX  
LATITUDE: 27 DEGREES 31 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.88	3.67	4.52	5.24	5.88	6.42	6.65	6.06	5.11	4.39	3.26	2.68	1728.6	4.7
10.0	3.22	3.96	4.71	5.29	5.80	6.28	6.56	6.13	5.36	4.80	3.68	3.05	1791.2	4.9
15.0	3.36	4.08	4.77	5.27	5.72	6.15	6.45	6.11	5.43	4.96	3.86	3.21	1807.6	5.0
20.0	3.49	4.17	4.81	5.22	5.60	5.99	6.31	6.06	5.48	5.10	4.02	3.35	1813.8	5.0
25.0	3.59	4.24	4.82	5.15	5.45	5.79	6.14	5.97	5.49	5.20	4.15	3.48	1809.9	5.0
30.0	3.68	4.28	4.80	5.05	5.27	5.58	5.93	5.85	5.47	5.27	4.26	3.58	1796.4	4.9
35.0	3.74	4.30	4.75	4.92	5.08	5.34	5.70	5.70	5.42	5.32	4.34	3.66	1773.7	4.9
40.0	3.78	4.30	4.68	4.77	4.86	5.07	5.44	5.52	5.34	5.33	4.40	3.72	1741.0	4.8
45.0	3.80	4.27	4.58	4.59	4.61	4.78	5.15	5.30	5.23	5.31	4.43	3.76	1698.7	4.7
50.0	3.80	4.22	4.46	4.39	4.34	4.46	4.83	5.06	5.09	5.25	4.43	3.78	1647.1	4.5
60.0	3.73	4.05	4.15	3.93	3.75	3.78	4.13	4.50	4.73	5.05	4.36	3.75	1517.9	4.2
70.0	3.58	3.79	3.75	3.39	3.12	3.08	3.40	3.85	4.26	4.74	4.19	3.62	1361.3	3.7
80.0	3.34	3.44	3.27	2.80	2.47	2.38	2.63	3.14	3.70	4.31	3.92	3.41	1180.3	3.2
90.0	3.03	3.03	2.74	2.20	1.87	1.78	1.93	2.42	3.08	3.79	3.55	3.13	989.0	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LAREDO TX  
 LATITUDE: 27 DEGREES 32 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	3.02	3.78	4.77	5.44	6.15	6.54	6.72	6.33	5.37	4.44	3.28	2.80	1786.0	4.9
10.0	3.39	4.09	4.99	5.49	6.07	6.39	6.62	6.41	5.63	4.86	3.70	3.20	1852.5	5.1
15.0	3.54	4.21	5.06	5.48	5.97	6.26	6.52	6.39	5.71	5.03	3.88	3.37	1870.1	5.1
20.0	3.68	4.30	5.09	5.43	5.85	6.09	6.38	6.34	5.76	5.17	4.04	3.53	1877.2	5.1
25.0	3.80	4.38	5.10	5.35	5.69	5.89	6.20	6.24	5.78	5.27	4.18	3.66	1873.7	5.1
30.0	3.89	4.43	5.09	5.24	5.51	5.67	5.99	6.12	5.76	5.35	4.29	3.78	1860.2	5.1
35.0	3.96	4.45	5.04	5.11	5.30	5.43	5.76	5.96	5.71	5.39	4.37	3.87	1836.9	5.0
40.0	4.01	4.45	4.96	4.95	5.07	5.15	5.49	5.77	5.63	5.41	4.43	3.93	1803.3	4.9
45.0	4.03	4.42	4.86	4.77	4.80	4.85	5.20	5.54	5.51	5.39	4.46	3.98	1759.6	4.8
50.0	4.03	4.37	4.73	4.56	4.52	4.53	4.88	5.29	5.37	5.33	4.47	4.00	1706.2	4.7
60.0	3.96	4.19	4.40	4.07	3.89	3.83	4.16	4.70	4.98	5.13	4.40	3.96	1572.1	4.3
70.0	3.80	3.92	3.97	3.51	3.23	3.12	3.42	4.01	4.49	4.81	4.22	3.84	1409.3	3.9
80.0	3.55	3.57	3.47	2.89	2.53	2.40	2.65	3.26	3.90	4.38	3.95	3.62	1220.8	3.3
90.0	3.22	3.14	2.90	2.26	1.90	1.79	1.94	2.49	3.23	3.85	3.58	3.31	1021.3	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LUBBOCK  
LATITUDE: 33 DEGREES 39 MINUTES  
TX

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	3.25	4.20	5.55	6.83	7.56	8.02	7.60	6.97	5.74	4.63	3.52	2.95	2034.1	5.6
10.0	3.83	4.70	5.95	7.02	7.55	7.92	7.59	7.16	6.16	5.24	4.19	3.58	2157.9	5.9
15.0	4.09	4.91	6.10	7.05	7.47	7.80	7.51	7.19	6.31	5.49	4.49	3.87	2200.6	6.0
20.0	4.33	5.09	6.21	7.04	7.35	7.63	7.39	7.18	6.42	5.72	4.77	4.13	2230.0	6.1
25.0	4.53	5.25	6.28	6.98	7.19	7.42	7.23	7.13	6.50	5.90	5.01	4.37	2246.0	6.2
30.0	4.71	5.36	6.31	6.89	6.99	7.17	7.02	7.03	6.54	6.05	5.22	4.58	2248.2	6.2
35.0	4.86	5.45	6.31	6.75	6.75	6.88	6.78	6.89	6.53	6.17	5.40	4.76	2237.5	6.1
40.0	4.98	5.50	6.27	6.58	6.49	6.57	6.51	6.72	6.49	6.24	5.54	4.91	2215.0	6.1
45.0	5.07	5.52	6.19	6.37	6.19	6.22	6.21	6.50	6.41	6.27	5.65	5.03	2179.1	6.0
50.0	5.12	5.51	6.07	6.13	5.85	5.84	5.87	6.25	6.28	6.27	5.71	5.11	2130.1	5.8
60.0	5.13	5.38	5.73	5.54	5.09	4.99	5.10	5.64	5.93	6.14	5.74	5.18	1994.2	5.5
70.0	5.01	5.11	5.26	4.82	4.23	4.08	4.23	4.91	5.43	5.85	5.62	5.11	1814.0	5.0
80.0	4.76	4.73	4.66	4.01	3.37	3.15	3.36	4.07	4.80	5.41	5.35	4.91	1598.1	4.4
90.0	4.39	4.23	3.96	3.15	2.49	2.28	2.47	3.18	4.07	4.85	4.94	4.58	1355.1	3.7



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LUFKIN TX  
LATITUDE: 31 DEGREES 14 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.50	3.38	4.33	5.12	5.89	6.48	6.33	5.87	4.82	4.25	3.03	2.42	1657.3	4.5
10.0	2.82	3.69	4.56	5.20	5.85	6.38	6.28	5.98	5.09	4.72	3.49	2.81	1731.7	4.7
15.0	2.97	3.81	4.64	5.20	5.78	6.27	6.21	5.99	5.18	4.91	3.69	2.98	1754.5	4.8
20.0	3.09	3.91	4.69	5.18	5.68	6.13	6.10	5.96	5.25	5.07	3.86	3.14	1767.4	4.8
25.0	3.20	4.00	4.71	5.12	5.55	5.96	5.95	5.89	5.28	5.21	4.02	3.28	1770.3	4.9
30.0	3.28	4.05	4.71	5.03	5.39	5.75	5.78	5.80	5.28	5.31	4.15	3.40	1763.2	4.8
35.0	3.35	4.09	4.68	4.93	5.21	5.53	5.58	5.67	5.25	5.38	4.25	3.49	1747.4	4.8
40.0	3.40	4.10	4.63	4.79	5.00	5.28	5.35	5.51	5.19	5.41	4.33	3.57	1722.2	4.7
45.0	3.44	4.09	4.55	4.63	4.78	5.00	5.10	5.33	5.11	5.42	4.38	3.63	1687.3	4.6
50.0	3.45	4.06	4.45	4.45	4.52	4.70	4.82	5.11	4.99	5.39	4.41	3.66	1643.1	4.5
60.0	3.41	3.92	4.17	4.02	3.95	4.03	4.19	4.60	4.67	5.23	4.38	3.66	1528.1	4.2
70.0	3.29	3.70	3.80	3.51	3.33	3.34	3.51	3.99	4.26	4.95	4.24	3.57	1383.4	3.8
80.0	3.09	3.39	3.36	2.94	2.69	2.62	2.80	3.31	3.75	4.55	4.00	3.40	1213.3	3.3
90.0	2.83	3.01	2.85	2.36	2.06	1.97	2.12	2.61	3.17	4.04	3.66	3.14	1028.3	2.8

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MIDLAND-ODESSA IX  
LATITUDE: 31 DEGREES 56 MINUTES

AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	3.40	4.36	5.79	6.91	7.67	8.08	7.53	6.97	5.81	4.80	3.70	3.15	2075.9	5.7
10.0	3.97	4.86	6.18	7.07	7.63	7.95	7.49	7.13	6.20	5.40	4.37	3.79	2193.0	6.0
15.0	4.22	5.06	6.33	7.09	7.54	7.81	7.40	7.15	6.34	5.64	4.66	4.08	2232.0	6.1
20.0	4.45	5.23	6.43	7.06	7.40	7.63	7.26	7.13	6.44	5.86	4.93	4.34	2257.5	6.2
25.0	4.65	5.38	6.49	6.99	7.22	7.40	7.09	7.06	6.50	6.04	5.16	4.58	2269.4	6.2
30.0	4.82	5.49	6.52	6.88	7.00	7.13	6.87	6.95	6.52	6.18	5.37	4.78	2267.5	6.2
35.0	4.96	5.56	6.50	6.74	6.75	6.84	6.63	6.80	6.51	6.28	5.53	4.96	2253.3	6.2
40.0	5.07	5.61	6.45	6.55	6.47	6.51	6.35	6.61	6.45	6.34	5.66	5.10	2226.3	6.1
45.0	5.14	5.61	6.35	6.33	6.16	6.14	6.04	6.39	6.35	6.36	5.76	5.21	2186.0	6.0
50.0	5.19	5.59	6.22	6.07	5.80	5.75	5.69	6.13	6.22	6.34	5.82	5.29	2132.5	5.8
60.0	5.17	5.43	5.85	5.46	5.01	4.86	4.91	5.50	5.84	6.18	5.82	5.34	1988.0	5.4
70.0	5.03	5.15	5.33	4.72	4.13	3.95	4.06	4.75	5.32	5.87	5.67	5.24	1800.7	4.9
80	4.76	4.74	4.70	3.88	3.24	3.00	3.19	3.90	4.68	5.41	5.37	5.02	1577.2	4.3
90.0	4.37	4.21	3.96	3.02	2.36	2.14	2.33	3.03	3.94	4.81	4.93	4.66	1330.2	3.6

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: PORT ARTHUR TX  
 LATITUDE: 29 DEGREES 57 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.52	3.38	4.26	5.08	5.90	6.34	5.82	5.48	4.81	4.17	3.00	2.37	1618.0	4.4
10.0	2.83	3.67	4.47	5.15	5.85	6.23	5.77	5.56	5.06	4.59	3.42	2.72	1683.8	4.6
15.0	2.96	3.79	4.53	5.14	5.77	6.12	5.69	5.55	5.14	4.77	3.60	2.88	1702.8	4.7
20.0	3.07	3.88	4.57	5.11	5.67	5.97	5.59	5.52	5.19	4.91	3.75	3.02	1712.4	4.7
25.0	3.17	3.95	4.59	5.05	5.53	5.80	5.45	5.45	5.22	5.03	3.89	3.14	1712.5	4.7
30.0	3.25	4.00	4.58	4.96	5.36	5.59	5.29	5.36	5.21	5.11	4.00	3.24	1703.0	4.7
35.0	3.32	4.03	4.55	4.84	5.18	5.37	5.11	5.23	5.18	5.17	4.09	3.32	1685.5	4.6
40.0	3.36	4.04	4.49	4.71	4.97	5.12	4.90	5.08	5.11	5.19	4.16	3.39	1658.7	4.5
45.0	3.38	4.02	4.41	4.54	4.73	4.84	4.66	4.90	5.02	5.19	4.20	3.43	1622.7	4.4
50.0	3.39	3.98	4.30	4.36	4.47	4.54	4.41	4.70	4.90	5.15	4.21	3.46	1577.9	4.3
60.0	3.33	3.84	4.02	3.93	3.89	3.88	3.83	4.22	4.57	4.98	4.17	3.44	1463.2	4.0
70.0	3.21	3.60	3.66	3.42	3.27	3.21	3.22	3.66	4.15	4.69	4.02	3.34	1321.5	3.6
80.0	3.01	3.30	3.22	2.85	2.62	2.51	2.58	3.04	3.64	4.30	3.78	3.17	1155.6	3.2
90.0	2.74	2.92	2.72	2.28	2.00	1.89	1.97	2.40	3.06	3.81	3.45	2.92	977.6	2.7

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SAN ANGELO TX  
 LATITUDE: 31 DEGREES 22 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	3.02	3.81	5.05	5.83	6.41	6.89	6.69	6.19	5.06	4.22	3.29	2.82	1805.2	4.9
10.0	3.48	4.19	5.35	5.94	6.37	6.78	6.64	6.32	5.35	4.68	3.81	3.33	1895.1	5.2
15.0	3.67	4.34	5.46	5.95	6.29	6.66	6.56	6.32	5.46	4.87	4.04	3.56	1923.9	5.3
20.0	3.85	4.47	5.53	5.92	6.18	6.51	6.45	6.29	5.53	5.04	4.25	3.77	1941.6	5.3
25.0	4.00	4.58	5.57	5.85	6.04	6.32	6.29	6.23	5.57	5.17	4.43	3.95	1948.0	5.3
30.0	4.13	4.65	5.58	5.76	5.86	6.10	6.10	6.13	5.57	5.27	4.59	4.11	1943.2	5.3
35.0	4.23	4.70	5.56	5.63	5.66	5.86	5.89	5.99	5.55	5.34	4.71	4.24	1928.4	5.3
40.0	4.31	4.73	5.50	5.48	5.43	5.59	5.65	5.83	5.49	5.38	4.81	4.35	1903.0	5.2
45.0	4.36	4.72	5.41	5.30	5.18	5.29	5.38	5.63	5.40	5.38	4.87	4.43	1866.7	5.1
50.0	4.39	4.69	5.29	5.08	4.89	4.97	5.08	5.40	5.28	5.35	4.91	4.48	1819.6	5.0
60.0	4.36	4.54	4.96	4.58	4.26	4.24	4.40	4.85	4.94	5.20	4.89	4.50	1695.1	4.6
70.0	4.22	4.29	4.52	3.98	3.56	3.50	3.67	4.21	4.50	4.92	4.74	4.41	1536.5	4.2
80.0	3.98	3.94	3.99	3.31	2.85	2.72	2.92	3.48	3.96	4.52	4.48	4.20	1348.3	3.7
90.0	3.64	3.50	3.37	2.62	2.15	2.02	2.18	2.73	3.34	4.02	4.10	3.89	1142.3	3.1

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SAN ANTONIO TX  
LATITUDE: 29 DEGREES 32 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.82	3.64	4.56	5.09	5.98	6.52	6.69	6.13	5.16	4.26	3.18	2.67	1726.8	4.7
10.0	3.18	3.97	4.79	5.15	5.92	6.39	6.62	6.23	5.44	4.69	3.62	3.08	1799.2	4.9
15.0	3.34	4.09	4.86	5.14	5.84	6.28	6.53	6.23	5.53	4.87	3.82	3.26	1820.3	5.0
20.0	3.48	4.20	4.91	5.11	5.73	6.13	6.40	6.18	5.59	5.02	3.99	3.43	1831.2	5.0
25.0	3.60	4.28	4.93	5.04	5.59	5.94	6.23	6.11	5.62	5.13	4.14	3.57	1831.6	5.0
30.0	3.69	4.34	4.92	4.95	5.42	5.72	6.03	6.00	5.61	5.22	4.26	3.69	1821.9	5.0
35.0	3.77	4.37	4.88	4.84	5.23	5.49	5.81	5.86	5.57	5.27	4.36	3.79	1803.2	4.9
40.0	3.82	4.38	4.82	4.70	5.01	5.23	5.56	5.68	5.50	5.30	4.43	3.87	1774.3	4.9
45.0	3.85	4.36	4.73	4.53	4.77	4.94	5.28	5.48	5.40	5.29	4.47	3.93	1735.5	4.8
50.0	3.86	4.32	4.61	4.35	4.50	4.63	4.97	5.24	5.27	5.25	4.49	3.96	1687.1	4.6
60.0	3.81	4.16	4.31	3.91	3.91	3.94	4.28	4.69	4.92	5.07	4.44	3.94	1562.9	4.3
70.0	3.66	3.91	3.91	3.40	3.27	3.25	3.55	4.04	4.45	4.78	4.28	3.84	1409.4	3.9
80.0	3.44	3.57	3.44	2.83	2.61	2.52	2.78	3.31	3.90	4.37	4.02	3.63	1229.5	3.4
90.0	3.13	3.16	2.90	2.26	1.99	1.89	2.06	2.58	3.26	3.87	3.67	3.35	1036.7	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SHERMAN  
LATITUDE: 33 DEGREES 43 MINUTES  
TX

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.50	3.27	4.30	5.08	5.84	6.67	6.55	6.09	4.98	4.00	2.89	2.34	1660.3	4.5
10.0	2.88	3.60	4.55	5.19	5.82	6.59	6.54	6.24	5.30	4.48	3.38	2.78	1746.7	4.8
15.0	3.04	3.74	4.66	5.20	5.77	6.50	6.47	6.26	5.42	4.68	3.60	2.97	1775.2	4.9
20.0	3.19	3.85	4.71	5.19	5.63	6.37	6.37	6.25	5.51	4.85	3.79	3.15	1793.6	4.9
25.0	3.32	3.95	4.75	5.14	5.57	6.21	6.24	6.20	5.56	4.99	3.96	3.31	1801.9	4.9
30.0	3.43	4.02	4.76	5.07	5.42	6.01	6.07	6.11	5.58	5.10	4.11	3.44	1799.8	4.9
35.0	3.52	4.06	4.74	4.97	5.25	5.78	5.87	5.99	5.57	5.19	4.23	3.56	1787.9	4.9
40.0	3.54	4.09	4.70	4.85	5.06	5.53	5.64	5.84	5.53	5.24	4.33	3.66	1767.1	4.8
45.0	3.64	4.09	4.63	4.70	4.84	5.26	5.39	5.66	5.45	5.25	4.39	3.73	1736.3	4.8
50.0	3.67	4.07	4.54	4.53	4.60	4.96	5.11	5.45	5.35	5.24	4.44	3.78	1695.7	4.6
60.0	3.65	3.95	4.28	4.11	4.05	4.29	4.48	4.93	5.04	5.12	4.43	3.81	1586.5	4.3
70.0	3.55	3.75	3.93	3.62	3.44	3.58	3.76	4.31	4.62	4.87	4.32	3.74	1444.3	4.0
80.0	3.36	3.46	3.49	3.06	2.82	2.84	3.04	3.60	4.09	4.50	4.10	3.58	1276.1	3.5
90.0	3.09	3.10	2.99	2.48	2.18	2.14	2.31	2.86	3.49	4.03	3.78	3.33	1088.1	3.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KNH/SQ. M)

SITE: WACO TX  
LATITUDE: 31 DEGREES 37 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.62	3.46	4.50	5.08	5.59	6.66	6.71	6.18	5.05	4.10	3.01	2.53	1690.2	4.6
10.0	2.99	3.78	4.74	5.17	5.56	6.56	6.67	6.30	5.34	4.55	3.47	2.96	1769.3	4.8
15.0	3.14	3.92	4.83	5.17	5.50	6.45	6.59	6.31	5.45	4.74	3.67	3.15	1794.0	4.9
20.0	3.28	4.03	4.88	5.14	5.41	6.31	6.48	6.28	5.52	4.89	3.85	3.32	1808.5	5.0
25.0	3.40	4.12	4.91	5.09	5.29	6.13	6.32	6.22	5.56	5.02	4.01	3.48	1812.8	5.0
30.0	3.50	4.18	4.92	5.01	5.14	5.92	6.13	6.12	5.57	5.12	4.14	3.61	1806.8	5.0
35.0	3.58	4.22	4.89	4.90	4.97	5.69	5.92	5.99	5.54	5.19	4.25	3.72	1791.6	4.9
40.0	3.64	4.24	4.84	4.77	4.78	5.43	5.68	5.82	5.49	5.22	4.33	3.81	1766.8	4.8
45.0	3.68	4.23	4.76	4.61	4.57	5.15	5.41	5.63	5.40	5.22	4.38	3.87	1732.1	4.7
50.0	3.70	4.20	4.65	4.43	4.33	4.84	5.11	5.40	5.28	5.20	4.41	3.92	1687.6	4.6
60.0	3.66	4.06	4.36	4.01	3.80	4.14	4.43	4.86	4.95	5.05	4.38	3.92	1571.1	4.3
70.0	3.54	3.83	3.98	3.51	3.22	3.43	3.70	4.21	4.51	4.78	4.25	3.84	1423.7	3.9
80.0	3.33	3.52	3.52	2.94	2.62	2.68	2.94	3.49	3.97	4.40	4.01	3.65	1249.8	3.4
90.0	3.05	3.13	2.99	2.36	2.03	2.01	2.20	2.74	3.36	3.91	3.68	3.38	1059.7	2.9

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: WICHITA FALLS TX  
LATITUDE: 33 DEGREES 58 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.71	3.55	4.64	5.56	6.36	7.00	6.82	6.20	5.04	4.07	3.01	2.52	1750.6	4.8
10.0	3.15	3.93	4.93	5.69	6.35	6.92	6.81	6.37	5.38	4.57	3.54	3.02	1847.0	5.1
15.0	3.34	4.08	5.04	5.70	6.29	6.82	6.75	6.39	5.50	4.78	3.73	3.24	1879.4	5.1
20.0	3.51	4.22	5.12	5.69	6.19	6.69	6.64	6.38	5.59	4.96	3.99	3.45	1901.0	5.2
25.0	3.67	4.33	5.17	5.64	6.07	6.51	6.50	6.33	5.65	5.11	4.18	3.63	1911.5	5.2
30.0	3.80	4.41	5.19	5.57	5.90	6.30	6.32	6.24	5.68	5.23	4.34	3.79	1911.0	5.2
35.0	3.90	4.47	5.18	5.46	5.71	6.06	6.11	6.12	5.67	5.32	4.48	3.93	1899.8	5.2
40.0	3.99	4.51	5.14	5.32	5.50	5.80	5.88	5.97	5.63	5.37	4.59	4.05	1879.1	5.1
45.0	4.05	4.51	5.07	5.16	5.26	5.51	5.62	5.79	5.55	5.39	4.66	4.13	1847.5	5.1
50.0	4.08	4.49	4.97	4.97	5.00	5.20	5.33	5.57	5.44	5.38	4.71	4.19	1805.4	4.9
60.0	4.07	4.37	4.69	4.51	4.39	4.48	4.66	5.04	5.13	5.26	4.72	4.24	1690.6	4.6
70.0	3.97	4.15	4.30	3.96	3.70	3.73	3.91	4.41	4.71	5.01	4.61	4.17	1539.9	4.2
80.0	3.76	3.84	3.83	3.34	3.01	2.94	3.15	3.69	4.18	4.64	4.38	4.00	1360.9	3.7
90.0	3.47	3.44	3.27	2.68	2.30	2.21	2.37	2.93	3.56	4.15	4.04	3.73	1160.0	3.2



# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BRYCE CANYON UT  
 LATITUDE: 37 DEGREES 42 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	2.88	3.89	5.31	6.72	7.73	8.37	7.65	6.80	6.05	4.62	3.20	2.58	2004.2	5.5
10.0	3.49	4.44	5.76	6.97	7.79	8.34	7.70	7.06	6.62	5.36	3.95	3.26	2154.0	5.9
15.0	3.77	4.67	5.94	7.04	7.75	8.25	7.66	7.13	6.84	5.69	4.29	3.56	2209.6	6.1
20.0	4.03	4.88	6.08	7.06	7.66	8.11	7.57	7.15	7.02	5.98	4.60	3.85	2251.7	6.2
25.0	4.25	5.06	6.18	7.03	7.53	7.93	7.44	7.13	7.15	6.23	4.88	4.11	2279.9	6.2
30.0	4.46	5.20	6.25	6.97	7.35	7.69	7.26	7.06	7.24	6.43	5.13	4.34	2294.0	6.3
35.0	4.63	5.31	6.28	6.86	7.13	7.41	7.04	6.96	7.28	6.60	5.34	4.55	2294.0	6.3
40.0	4.77	5.39	6.26	6.72	6.87	7.10	6.79	6.81	7.28	6.73	5.52	4.72	2281.1	6.2
45.0	4.89	5.44	6.22	6.54	6.59	6.76	6.51	6.63	7.22	6.81	5.66	4.86	2255.7	6.2
50.0	4.97	5.45	6.13	6.32	6.28	6.39	6.19	6.41	7.13	6.84	5.77	4.98	2216.3	6.1
60.0	5.03	5.37	5.84	5.78	5.54	5.54	5.46	5.85	6.80	6.78	5.86	5.10	2097.4	5.7
70.0	4.96	5.16	5.42	5.11	4.68	4.58	4.61	5.17	6.30	6.53	5.80	5.09	1928.3	5.3
80.0	4.77	4.82	4.87	4.33	3.79	3.63	3.74	4.37	5.65	6.12	5.58	4.94	1720.4	4.7
90.0	4.45	4.37	4.20	3.47	2.86	2.66	2.82	3.49	4.86	5.55	5.21	4.66	1476.9	4.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CEDAR CITY UT  
LATITUDE: 37 DEGREES 42 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.78	3.72	5.16	6.60	7.78	8.53	7.89	7.07	6.21	4.60	3.13	2.48	2008.5	5.5
10.0	3.36	4.22	5.59	6.84	7.84	8.51	7.95	7.34	6.80	5.34	3.85	3.11	2154.3	5.9
15.0	3.63	4.44	5.75	6.90	7.80	8.41	7.91	7.41	7.03	5.66	4.17	3.39	2207.7	6.0
20.0	3.86	4.63	5.89	6.92	7.71	8.27	7.82	7.44	7.21	5.95	4.47	3.66	2247.7	6.2
25.0	4.08	4.79	5.98	6.90	7.57	8.08	7.68	7.42	7.36	6.19	4.74	3.90	2273.9	6.2
30.0	4.27	4.92	6.04	6.84	7.39	7.84	7.49	7.35	7.45	6.40	4.98	4.11	2286.0	6.3
35.0	4.43	5.03	6.07	6.73	7.17	7.55	7.27	7.24	7.50	6.57	5.19	4.30	2284.0	6.3
40.0	4.57	5.10	6.06	6.59	6.91	7.23	7.00	7.09	7.49	6.69	5.36	4.46	2269.2	6.2
45.0	4.67	5.14	6.01	6.42	6.63	6.89	6.72	6.90	7.44	6.77	5.49	4.60	2242.0	6.1
50.0	4.75	5.15	5.92	6.20	6.31	6.50	6.39	6.67	7.35	6.80	5.59	4.70	2201.0	6.0
60.0	4.80	5.07	5.64	5.67	5.57	5.63	5.62	6.09	7.01	6.74	5.68	4.81	2079.0	5.7
70.0	4.74	4.86	5.23	5.01	4.70	4.65	4.74	5.37	6.50	6.50	5.62	4.79	1907.5	5.2
80.0	4.55	4.54	4.70	4.25	3.81	3.66	3.83	4.53	5.82	6.08	5.40	4.65	1697.9	4.7
90.0	4.24	4.11	4.06	3.41	2.87	2.68	2.87	3.62	5.00	5.52	5.05	4.38	1453.4	4.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SALT LAKE CITY UT  
LATITUDE: 40 DEGREES 46 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.02	3.12	4.58	5.97	7.45	8.07	8.17	7.10	5.81	4.07	2.49	1.80	1848.4	5.1
10.0	2.43	3.55	4.99	6.22	7.55	8.09	8.29	7.44	6.42	4.78	3.09	2.25	1984.3	5.4
15.0	2.62	3.74	5.16	6.29	7.54	8.04	8.27	7.55	6.67	5.09	3.36	2.46	2034.8	5.6
20.0	2.79	3.91	5.29	6.32	7.48	7.93	8.21	7.60	6.88	5.37	3.61	2.65	2072.9	5.7
25.0	2.95	4.06	5.39	6.32	7.37	7.78	8.09	7.61	7.04	5.62	3.84	2.83	2098.5	5.7
30.0	3.08	4.18	5.46	6.28	7.23	7.58	7.92	7.57	7.16	5.83	4.04	2.99	2111.2	5.8
35.0	3.20	4.27	5.50	6.20	7.04	7.33	7.71	7.49	7.23	6.00	4.22	3.13	2111.1	5.8
40.0	3.30	4.34	5.50	6.09	6.81	7.05	7.45	7.35	7.25	6.13	4.37	3.25	2098.0	5.7
45.0	3.38	4.38	5.47	5.95	6.55	6.75	7.17	7.18	7.23	6.23	4.49	3.35	2074.6	5.7
50.0	3.44	4.40	5.41	5.78	6.27	6.41	6.85	6.97	7.16	6.28	4.59	3.42	2039.0	5.6
60.0	3.49	4.45	5.19	5.33	5.60	5.64	6.09	6.42	6.89	6.26	4.68	3.51	1931.2	5.3
70.0	3.45	4.20	4.85	4.77	4.80	4.74	5.19	5.72	6.44	6.07	4.65	3.51	1777.4	4.9
80.0	3.33	3.95	4.40	4.10	3.95	3.84	4.23	4.83	5.83	5.73	4.50	3.42	1587.0	4.3
90.0	3.12	3.60	3.85	3.36	3.07	2.89	3.24	3.96	5.07	5.24	4.23	3.24	1364.8	3.7

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: NORFOLK  
VA  
LATITUDE: 36 DEGREES 54 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.13	2.94	4.03	5.29	5.95	6.31	5.84	5.30	4.39	3.42	2.55	1.97	1526.0	4.2
10.0	2.49	3.26	4.30	5.44	5.97	6.27	5.86	5.45	4.70	3.84	3.03	2.37	1613.5	4.4
15.0	2.65	3.40	4.40	5.47	5.93	6.21	5.82	5.48	4.82	4.02	3.25	2.55	1644.0	4.5
20.0	2.79	3.52	4.48	5.47	5.86	6.10	5.75	5.48	4.91	4.18	3.45	2.72	1665.2	4.6
25.0	2.91	3.61	4.53	5.44	5.76	5.97	5.65	5.45	4.97	4.31	3.62	2.87	1677.0	4.6
30.0	3.02	3.69	4.56	5.38	5.62	5.80	5.51	5.39	5.00	4.42	3.77	3.00	1679.3	4.6
35.0	3.11	3.75	4.56	5.29	5.46	5.60	5.35	5.30	5.00	4.50	3.90	3.12	1672.2	4.6
40.0	3.19	3.78	4.53	5.17	5.27	5.38	5.17	5.19	4.97	4.56	4.01	3.21	1656.7	4.5
45.0	3.24	3.79	4.48	5.03	5.07	5.14	4.97	5.05	4.92	4.58	4.09	3.29	1632.5	4.5
50.0	3.27	3.78	4.40	4.86	4.83	4.88	4.74	4.88	4.84	4.58	4.14	3.34	1599.2	4.4
60.0	3.28	3.70	4.18	4.45	4.29	4.28	4.21	4.46	4.59	4.50	4.17	3.39	1506.3	4.1
70.0	3.21	3.53	3.86	3.95	3.68	3.62	3.61	3.95	4.24	4.31	4.10	3.36	1381.1	3.8
80.0	3.06	3.28	3.47	3.37	3.04	2.94	2.99	3.37	3.80	4.01	3.92	3.23	1231.4	3.4
90.0	2.84	2.96	3.00	2.74	2.37	2.27	2.33	2.74	3.28	3.62	3.64	3.03	1059.7	2.9

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: RICHMOND VA  
 LATITUDE: 37 DEGREES 30 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.99	2.77	3.81	4.94	5.55	5.90	5.59	5.05	4.24	3.26	2.31	1.79	1437.2	3.9
10.0	2.32	3.07	4.06	5.08	5.57	5.88	5.61	5.19	4.54	3.66	2.73	2.15	1518.4	4.2
15.0	2.46	3.20	4.15	5.11	5.54	5.82	5.58	5.22	4.65	3.83	2.92	2.31	1546.7	4.2
20.0	2.59	3.30	4.23	5.11	5.48	5.73	5.51	5.23	4.74	3.98	3.09	2.46	1566.4	4.3
25.0	2.71	3.40	4.27	5.09	5.39	5.61	5.42	5.20	4.80	4.11	3.24	2.59	1577.5	4.3
30.0	2.81	3.47	4.30	5.03	5.26	5.45	5.30	5.14	4.83	4.21	3.38	2.71	1579.7	4.3
35.0	2.89	3.52	4.30	4.95	5.12	5.27	5.15	5.06	4.83	4.29	3.49	2.81	1573.2	4.3
40.0	2.96	3.55	4.28	4.84	4.95	5.07	4.97	4.95	4.81	4.34	3.58	2.90	1558.7	4.3
45.0	3.01	3.56	4.23	4.71	4.76	4.86	4.78	4.82	4.76	4.37	3.65	2.97	1536.4	4.2
50.0	3.04	3.56	4.16	4.56	4.55	4.62	4.57	4.66	4.68	4.37	3.70	3.01	1505.6	4.1
60.0	3.05	3.48	3.95	4.18	4.06	4.07	4.08	4.27	4.45	4.29	3.72	3.06	1419.5	3.9
70.0	2.98	3.32	3.66	3.72	3.49	3.46	3.51	3.80	4.12	4.11	3.66	3.02	1303.6	3.6
80.0	2.85	3.09	3.29	3.19	2.91	2.85	2.92	3.26	3.69	3.83	3.50	2.91	1164.6	3.2
90.0	2.64	2.79	2.86	2.62	2.30	2.23	2.30	2.66	3.20	3.47	3.25	2.74	1005.2	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: ROANOKE  
VA  
LATITUDE: 37 DEGREES 19 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.03	2.84	3.89	4.99	5.56	5.94	5.66	5.11	4.28	3.41	2.41	1.87	1462.7	4.0
10.0	2.43	3.15	4.15	5.13	5.58	5.91	5.68	5.26	4.58	3.84	2.86	2.25	1547.5	4.2
15.0	2.58	3.28	4.25	5.16	5.55	5.85	5.64	5.29	4.69	4.03	3.06	2.42	1577.2	4.3
20.0	2.72	3.39	4.32	5.16	5.49	5.76	5.58	5.29	4.78	4.19	3.24	2.58	1598.2	4.4
25.0	2.85	3.49	4.37	5.13	5.39	5.63	5.48	5.27	4.84	4.33	3.40	2.72	1610.3	4.4
30.0	2.96	3.56	4.40	5.07	5.27	5.48	5.36	5.21	4.87	4.44	3.54	2.84	1613.3	4.4
35.0	3.05	3.62	4.40	4.99	5.12	5.30	5.20	5.12	4.87	4.52	3.66	2.95	1607.3	4.4
40.0	3.12	3.65	4.38	4.88	4.95	5.10	5.03	5.01	4.85	4.58	3.76	3.04	1593.2	4.4
45.0	3.17	3.66	4.33	4.75	4.76	4.88	4.83	4.88	4.79	4.61	3.83	3.11	1571.0	4.3
50.0	3.21	3.66	4.25	4.60	4.55	4.63	4.62	4.72	4.72	4.61	3.88	3.17	1540.1	4.2
60.0	3.22	3.58	4.04	4.21	4.06	4.08	4.11	4.32	4.48	4.53	3.91	3.21	1453.0	4.0
70.0	3.15	3.41	3.74	3.75	3.49	3.47	3.53	3.84	4.14	4.34	3.84	3.18	1335.2	3.7
80.0	3.01	3.18	3.36	3.21	2.91	2.85	2.94	3.29	3.72	4.05	3.68	3.07	1193.5	3.3
90.0	2.79	2.87	2.92	2.63	2.29	2.23	2.31	2.68	3.21	3.67	3.42	2.88	1030.7	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: BURLINGTON VT  
LATITUDE: 44 DEGREES 28 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.22	1.91	2.96	4.09	4.96	5.45	5.43	4.65	3.53	2.34	1.18	0.89	1177.3	3.2
10.0	1.44	2.14	3.19	4.25	5.04	5.49	5.52	4.85	3.85	2.68	1.39	1.14	1248.9	3.4
15.0	1.54	2.24	3.28	4.29	5.04	5.46	5.52	4.91	3.97	2.83	1.49	1.26	1274.9	3.5
20.0	1.63	2.33	3.36	4.32	5.01	5.41	5.49	4.95	4.08	2.96	1.57	1.36	1294.2	3.5
25.0	1.71	2.40	3.42	4.32	4.96	5.33	5.43	4.95	4.16	3.08	1.65	1.46	1306.5	3.6
30.0	1.79	2.47	3.45	4.30	4.88	5.22	5.34	4.93	4.21	3.18	1.72	1.55	1311.6	3.6
35.0	1.85	2.51	3.47	4.25	4.77	5.09	5.23	4.89	4.25	3.26	1.78	1.63	1309.5	3.6
40.0	1.90	2.55	3.47	4.19	4.64	4.92	5.08	4.81	4.26	3.32	1.83	1.70	1300.3	3.6
45.0	1.94	2.57	3.46	4.10	4.49	4.74	4.91	4.71	4.24	3.36	1.87	1.76	1284.2	3.5
50.0	1.97	2.57	3.42	3.99	4.33	4.55	4.73	4.59	4.20	3.39	1.89	1.81	1262.5	3.5
60.0	2.00	2.54	3.29	3.72	3.94	4.10	4.30	4.28	4.05	3.37	1.92	1.87	1199.1	3.3
70.0	1.98	2.46	3.09	3.38	3.48	3.57	3.78	3.88	3.81	3.27	1.89	1.88	1110.3	3.0
80.0	1.91	2.32	2.83	2.97	2.96	3.01	3.20	3.40	3.48	3.10	1.83	1.85	1000.0	2.7
90.0	1.80	2.12	2.51	2.51	2.44	2.44	2.62	2.86	3.08	2.85	1.72	1.76	874.0	2.4

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJH/SQ. M)

SITE: OLYMPIA  
WA  
LATITUDE: 46 DEGREES 58 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	0.85	1.58	2.66	3.96	5.14	5.34	6.04	4.88	3.65	2.01	1.07	0.70	1155.2	3.2
10.0	1.05	1.77	2.87	4.13	5.25	5.39	6.17	5.13	4.02	2.31	1.29	0.90	1228.8	3.4
15.0	1.14	1.85	2.96	4.19	5.26	5.37	6.19	5.22	4.17	2.45	1.39	1.00	1255.9	3.4
20.0	1.22	1.92	3.03	4.22	5.24	5.33	6.17	5.27	4.30	2.57	1.49	1.09	1276.4	3.5
25.0	1.30	1.98	3.09	4.23	5.20	5.27	6.12	5.29	4.41	2.68	1.57	1.17	1290.0	3.5
30.0	1.37	2.03	3.13	4.22	5.12	5.17	6.04	5.29	4.49	2.77	1.65	1.25	1296.5	3.6
35.0	1.43	2.07	3.15	4.18	5.03	5.05	5.92	5.25	4.54	2.85	1.71	1.32	1295.7	3.5
40.0	1.48	2.09	3.16	4.13	4.90	4.90	5.77	5.19	4.57	2.91	1.77	1.38	1287.8	3.5
45.0	1.53	2.11	3.15	4.05	4.75	4.73	5.59	5.10	4.57	2.95	1.81	1.43	1272.8	3.5
50.0	1.56	2.12	3.12	3.95	4.58	4.54	5.39	4.98	4.54	2.98	1.85	1.47	1251.9	3.4
60.0	1.60	2.09	3.01	3.70	4.19	4.12	4.92	4.66	4.41	2.98	1.89	1.52	1191.3	3.3
70.0	1.60	2.02	2.84	3.38	3.72	3.62	4.34	4.25	4.17	2.90	1.88	1.54	1105.2	3.0
80.0	1.56	1.91	2.61	2.99	3.19	3.07	3.69	3.75	3.84	2.76	1.82	1.52	996.6	2.7
90.0	1.48	1.76	2.34	2.55	2.64	2.52	3.02	3.18	3.42	2.56	1.73	1.46	872.4	2.4



AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KJH/SQ. M)

SITE: SEATTLE-TACOMA WA  
LATITUDE: 47 DEGREES 27 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.83	1.56	2.68	4.07	5.41	5.68	7.08	5.10	3.61	2.07	1.06	0.67	1215.0	3.3
10.0	1.02	1.74	2.90	4.26	5.52	5.74	7.27	5.38	3.99	2.40	1.29	0.86	1293.6	3.5
15.0	1.11	1.82	3.00	4.32	5.53	5.72	7.30	5.47	4.15	2.55	1.40	0.96	1322.5	3.6
20.0	1.20	1.89	3.07	4.36	5.52	5.68	7.30	5.54	4.28	2.69	1.49	1.04	1344.4	3.7
25.0	1.28	1.95	3.13	4.37	5.48	5.61	7.24	5.57	4.39	2.81	1.58	1.13	1358.9	3.7
30.0	1.35	2.01	3.17	4.37	5.40	5.52	7.15	5.57	4.47	2.91	1.66	1.20	1365.8	3.7
35.0	1.41	2.05	3.20	4.33	5.30	5.39	7.02	5.54	4.52	2.99	1.73	1.27	1364.9	3.7
40.0	1.46	2.07	3.21	4.28	5.17	5.23	6.84	5.47	4.55	3.06	1.79	1.32	1356.4	3.7
45.0	1.51	2.09	3.20	4.20	5.01	5.05	6.63	5.38	4.55	3.11	1.84	1.37	1340.2	3.7
50.0	1.54	2.10	3.17	4.10	4.84	4.85	6.38	5.26	4.53	3.14	1.88	1.42	1317.6	3.6
60.0	1.58	2.08	3.07	3.85	4.43	4.40	5.82	4.93	4.40	3.15	1.92	1.47	1252.9	3.4
70.0	1.58	2.01	2.90	3.51	3.93	3.86	5.12	4.50	4.17	3.08	1.91	1.49	1160.8	3.2
80.0	1.54	1.90	2.67	3.11	3.37	3.27	4.32	3.97	3.84	2.93	1.86	1.47	1044.6	2.9
90.0	1.47	1.76	2.39	2.66	2.78	2.68	3.50	3.36	3.43	2.72	1.76	1.41	911.9	2.5

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: SPOKANE  
WA  
LATITUDE: 47 DEGREES 38 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.00	1.91	3.28	4.71	6.05	6.57	7.44	6.12	4.52	2.65	1.25	0.80	1412.4	3.9
10.0	1.19	2.19	3.61	4.96	6.19	6.65	7.64	6.51	5.09	3.16	1.57	1.01	1518.3	4.2
15.0	1.28	2.32	3.75	5.04	6.21	6.64	7.68	6.65	5.32	3.39	1.72	1.10	1558.6	4.3
20.0	1.37	2.43	3.86	5.09	6.20	6.59	7.68	6.75	5.53	3.60	1.86	1.19	1590.2	4.4
25.0	1.44	2.53	3.95	5.12	6.16	6.52	7.63	6.80	5.70	3.79	1.98	1.27	1612.7	4.4
30.0	1.51	2.62	4.02	5.11	6.08	6.40	7.53	6.82	5.83	3.96	2.10	1.34	1625.8	4.5
35.0	1.57	2.69	4.07	5.08	5.97	6.25	7.39	6.79	5.93	4.10	2.20	1.41	1629.3	4.5
40.0	1.62	2.74	4.10	5.02	5.82	6.07	7.21	6.72	5.99	4.21	2.29	1.47	1623.3	4.4
45.0	1.66	2.78	4.10	4.93	5.64	5.85	6.98	6.61	6.01	4.30	2.36	1.52	1607.7	4.4
50.0	1.69	2.81	4.07	4.82	5.44	5.61	6.72	6.47	6.00	4.36	2.42	1.56	1583.9	4.3
60.0	1.72	2.80	3.96	4.52	4.98	5.08	6.13	6.08	5.86	4.39	2.49	1.61	1511.6	4.1
70.0	1.72	2.73	3.75	4.13	4.41	4.44	5.39	5.54	5.57	4.32	2.50	1.62	1404.7	3.8
80.0	1.67	2.60	3.46	3.66	3.76	3.73	4.54	4.88	5.15	4.13	2.44	1.59	1266.8	3.5
90.0	1.58	2.41	3.10	3.11	3.08	3.02	3.67	4.11	4.60	3.85	2.32	1.52	1106.8	3.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: WHIDBEY ISLAND WA  
LATITUDE: 48 DEGREES 21 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	0.89	1.68	2.89	4.24	5.55	5.73	6.25	5.02	3.70	2.06	1.12	0.73	1215.7	3.3
10.0	1.14	1.91	3.16	4.45	5.67	5.80	6.40	5.31	4.11	2.42	1.40	0.92	1302.2	3.6
15.0	1.25	2.01	3.27	4.52	5.69	5.79	6.43	5.40	4.28	2.58	1.53	1.00	1335.0	3.7
20.0	1.36	2.11	3.37	4.57	5.69	5.75	6.43	5.47	4.43	2.72	1.65	1.08	1360.7	3.7
25.0	1.46	2.19	3.45	4.59	5.65	5.69	6.38	5.51	4.55	2.85	1.76	1.16	1378.9	3.8
30.0	1.55	2.26	3.51	4.59	5.58	5.59	6.31	5.51	4.64	2.96	1.86	1.23	1389.4	3.9
35.0	1.63	2.31	3.54	4.56	5.48	5.47	6.19	5.49	4.71	3.05	1.95	1.29	1392.0	3.8
40.0	1.70	2.36	3.56	4.50	5.35	5.31	6.04	5.43	4.75	3.13	2.03	1.34	1386.7	3.8
45.0	1.76	2.39	3.56	4.43	5.19	5.13	5.86	5.34	4.76	3.18	2.09	1.38	1373.6	3.8
50.0	1.81	2.40	3.54	4.33	5.01	4.93	5.65	5.22	4.74	3.22	2.15	1.42	1353.4	3.7
60.0	1.87	2.39	3.44	4.06	4.59	4.48	5.17	4.91	4.62	3.24	2.21	1.47	1293.3	3.5
70.0	1.88	2.33	3.26	3.72	4.09	3.95	4.59	4.49	4.39	3.17	2.21	1.48	1204.8	3.3
80.0	1.84	2.22	3.01	3.30	3.50	3.35	3.91	3.97	4.06	3.03	2.17	1.45	1090.6	3.0
90.0	1.76	2.05	2.70	2.82	2.90	2.75	3.21	3.38	3.63	2.82	2.06	1.39	958.2	2.6

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: YAKIMA WA  
LATITUDE: 46 DEGREES 34 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.15	2.10	3.54	5.04	6.33	6.83	7.43	6.23	4.68	2.81	1.40	0.93	1478.0	4.0
10.0	1.40	2.42	3.89	5.30	6.47	6.91	7.62	6.61	5.24	3.34	1.75	1.17	1588.9	4.4
15.0	1.51	2.56	4.03	5.38	6.49	6.89	7.65	6.74	5.48	3.58	1.92	1.28	1631.0	4.5
20.0	1.61	2.68	4.16	5.44	6.48	6.84	7.64	6.83	5.68	3.79	2.07	1.38	1664.0	4.6
25.0	1.70	2.79	4.25	5.46	6.43	6.75	7.58	6.87	5.85	3.98	2.20	1.48	1687.3	4.6
30.0	1.78	2.88	4.33	5.45	6.34	6.63	7.48	6.88	5.98	4.15	2.33	1.56	1700.6	4.7
35.0	1.86	2.96	4.38	5.42	6.21	6.46	7.33	6.85	6.07	4.29	2.44	1.64	1703.9	4.7
40.0	1.92	3.02	4.40	5.35	6.05	6.26	7.14	6.77	6.13	4.41	2.54	1.71	1697.1	4.6
45.0	1.97	3.06	4.40	5.25	5.86	6.03	6.90	6.65	6.14	4.49	2.62	1.77	1680.3	4.6
50.0	2.01	3.09	4.37	5.13	5.65	5.78	6.65	6.50	6.12	4.55	2.68	1.81	1655.4	4.5
60.0	2.05	3.08	4.24	4.80	5.15	5.21	6.04	6.09	5.96	4.58	2.75	1.87	1578.4	4.3
70.0	2.04	3.00	4.01	4.37	4.54	4.53	5.29	5.53	5.66	4.49	2.76	1.88	1465.0	4.0
80.0	1.98	2.85	3.69	3.85	3.84	3.79	4.44	4.85	5.21	4.29	2.69	1.84	1319.2	3.6
90.0	1.88	2.63	3.29	3.26	3.13	3.04	3.57	4.07	4.64	3.98	2.56	1.76	1150.6	3.2

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KW/H/SQ. M)

SITE: EAU CLAIRE WI  
LATITUDE: 44 DEGREES 52 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.43	2.35	3.43	4.49	5.31	5.90	5.95	5.11	3.77	2.60	1.42	1.07	1305.3	3.6
10.0	1.74	2.70	3.74	4.69	5.39	5.94	6.06	5.35	4.12	3.02	1.74	1.34	1396.1	3.8
15.0	1.88	2.85	3.86	4.75	5.40	5.91	6.07	5.43	4.26	3.20	1.88	1.46	1430.3	3.9
20.0	2.02	2.99	3.97	4.78	5.37	5.86	6.04	5.48	4.38	3.37	2.01	1.57	1456.8	4.0
25.0	2.14	3.11	4.05	4.79	5.32	5.78	5.98	5.49	4.48	3.52	2.13	1.67	1475.1	4.0
30.0	2.24	3.21	4.11	4.77	5.23	5.66	5.88	5.48	4.54	3.64	2.24	1.77	1485.0	4.1
35.0	2.34	3.29	4.14	4.72	5.12	5.52	5.76	5.43	4.59	3.74	2.33	1.85	1486.6	4.1
40.0	2.42	3.35	4.15	4.65	4.98	5.34	5.60	5.35	4.60	3.82	2.42	1.92	1479.8	4.1
45.0	2.48	3.39	4.14	4.56	4.82	5.14	5.41	5.24	4.59	3.88	2.48	1.98	1464.7	4.0
50.0	2.53	3.42	4.10	4.44	4.64	4.93	5.21	5.11	4.55	3.91	2.53	2.03	1443.3	4.0
60.0	2.59	3.40	3.96	4.14	4.23	4.44	4.73	4.77	4.40	3.91	2.58	2.09	1376.3	3.8
70.0	2.57	3.30	3.73	3.76	3.73	3.86	4.15	4.32	4.14	3.81	2.57	2.10	1279.3	3.5
80.0	2.50	3.13	3.42	3.32	3.17	3.25	3.50	3.78	3.79	3.61	2.50	2.05	1155.8	3.2
90.0	2.36	2.88	3.03	2.79	2.60	2.62	2.85	3.18	3.36	3.33	2.36	1.95	1013.1	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: GREEN BAY WI  
LATITUDE: 44 DEGREES 29 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.42	2.29	3.48	4.54	5.42	6.02	5.96	5.12	3.84	2.58	1.47	1.10	1317.3	3.6
10.0	1.73	2.61	3.79	4.73	5.51	6.06	6.06	5.35	4.20	2.99	1.79	1.37	1406.9	3.9
15.0	1.86	2.75	3.91	4.79	5.51	6.03	6.06	5.43	4.34	3.17	1.94	1.49	1440.4	3.9
20.0	1.99	2.88	4.01	4.82	5.48	5.97	6.03	5.47	4.46	3.33	2.08	1.61	1466.1	4.0
25.0	2.11	2.98	4.09	4.82	5.43	5.88	5.97	5.49	4.55	3.47	2.20	1.71	1483.5	4.1
30.0	2.21	3.08	4.15	4.80	5.34	5.76	5.87	5.47	4.62	3.59	2.31	1.81	1492.6	4.1
35.0	2.30	3.15	4.18	4.76	5.22	5.61	5.75	5.42	4.66	3.68	2.41	1.89	1493.2	4.1
40.0	2.37	3.21	4.19	4.68	5.08	5.43	5.59	5.34	4.68	3.76	2.49	1.96	1485.4	4.1
45.0	2.44	3.24	4.18	4.59	4.91	5.23	5.40	5.23	4.67	3.81	2.56	2.02	1469.5	4.0
50.0	2.48	3.26	4.14	4.47	4.73	5.01	5.20	5.10	4.62	3.84	2.61	2.07	1447.0	4.0
60.0	2.53	3.24	3.99	4.16	4.30	4.50	4.71	4.75	4.46	3.83	2.66	2.13	1378.1	3.8
70.0	2.51	3.14	3.76	3.78	3.79	3.91	4.13	4.30	4.20	3.73	2.65	2.13	1279.0	3.5
80.0	2.44	2.97	3.44	3.31	3.21	3.28	3.48	3.76	3.84	3.53	2.57	2.08	1153.8	3.2
90.0	2.30	2.73	3.05	2.79	2.63	2.63	2.83	3.15	3.40	3.26	2.43	1.98	1009.5	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: LA CROSSE WI  
LATITUDE: 43 DEGREES 52 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.52	2.41	3.47	4.50	5.41	6.01	6.01	5.26	3.91	2.72	1.56	1.16	1338.2	3.7
10.0	1.84	2.75	3.76	4.68	5.49	6.04	6.10	5.50	4.27	3.14	1.90	1.44	1429.5	3.9
15.0	1.99	2.90	3.88	4.73	5.49	6.01	6.10	5.57	4.42	3.33	2.06	1.57	1463.6	4.0
20.0	2.12	3.03	3.98	4.76	5.46	5.95	6.06	5.62	4.54	3.49	2.20	1.69	1489.7	4.1
25.0	2.25	3.15	4.06	4.77	5.39	5.86	6.00	5.63	4.63	3.64	2.33	1.80	1507.4	4.1
30.0	2.36	3.24	4.11	4.74	5.31	5.74	5.90	5.61	4.70	3.76	2.45	1.90	1516.6	4.2
35.0	2.45	3.32	4.14	4.69	5.19	5.58	5.76	5.55	4.74	3.87	2.55	1.98	1517.2	4.2
40.0	2.53	3.38	4.15	4.62	5.04	5.40	5.60	5.47	4.75	3.94	2.64	2.06	1509.2	4.1
45.0	2.60	3.42	4.13	4.52	4.87	5.19	5.41	5.35	4.73	4.00	2.71	2.12	1493.2	4.1
50.0	2.65	3.44	4.09	4.40	4.69	4.97	5.20	5.21	4.69	4.03	2.76	2.17	1470.2	4.0
60.0	2.69	3.41	3.94	4.10	4.26	4.46	4.71	4.85	4.52	4.01	2.82	2.23	1399.9	3.8
70.0	2.68	3.31	3.70	3.71	3.74	3.87	4.12	4.38	4.25	3.90	2.80	2.23	1298.8	3.6
80.0	2.59	3.12	3.38	3.25	3.17	3.24	3.47	3.82	3.88	3.70	2.72	2.18	1171.6	3.2
90.0	2.45	2.87	2.99	2.73	2.59	2.59	2.81	3.19	3.43	3.40	2.56	2.07	1024.3	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: MADISON WI  
LATITUDE: 43 DEGREES 8 MINUTES

## AVERAGE DAILY AMOUNTS BY MONTH

ARRAY TILT	J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL AMOUNT	AVERAGE DAY
0.0	1.63	2.54	3.58	4.41	5.49	6.15	6.10	5.38	4.09	2.87	1.59	1.23	1372.8	3.8
10.0	1.97	2.89	3.88	4.58	5.57	6.18	6.19	5.62	4.47	3.32	1.93	1.51	1465.7	4.0
15.0	2.13	3.05	4.00	4.63	5.56	6.14	6.19	5.70	4.62	3.51	2.08	1.64	1500.2	4.1
20.0	2.27	3.18	4.10	4.65	5.53	6.08	6.15	5.74	4.74	3.69	2.22	1.76	1526.4	4.2
25.0	2.40	3.30	4.17	4.65	5.46	5.98	6.08	5.75	4.84	3.84	2.35	1.87	1544.0	4.2
30.0	2.52	3.40	4.23	4.63	5.37	5.85	5.97	5.72	4.91	3.97	2.46	1.97	1552.9	4.3
35.0	2.62	3.48	4.25	4.57	5.25	5.69	5.83	5.66	4.95	4.08	2.56	2.06	1553.0	4.3
40.0	2.71	3.54	4.26	4.50	5.10	5.50	5.66	5.57	4.96	4.16	2.64	2.14	1544.2	4.2
45.0	2.77	3.58	4.24	4.40	4.92	5.28	5.46	5.45	4.94	4.21	2.71	2.20	1527.4	4.2
50.0	2.83	3.60	4.19	4.28	4.74	5.05	5.25	5.31	4.89	4.24	2.76	2.25	1503.2	4.1
60.0	2.88	3.57	4.03	3.98	4.29	4.52	4.74	4.93	4.71	4.22	2.81	2.31	1429.8	3.9
70.0	2.85	3.45	3.78	3.60	3.76	3.91	4.14	4.44	4.42	4.10	2.79	2.31	1324.9	3.6
80.0	2.76	3.26	3.45	3.15	3.18	3.26	3.47	3.87	4.03	3.88	2.70	2.25	1193.6	3.3
90.0	2.60	2.99	3.05	2.64	2.59	2.59	2.80	3.21	3.55	3.56	2.54	2.13	1041.5	2.9



AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: MILWAUKEE  
 LATITUDE: 42 DEGREES 57 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.51	2.32	3.43	4.55	5.57	6.23	6.19	5.42	4.13	2.86	1.66	1.20	1373.4	3.8
10.0	1.81	2.62	3.71	4.72	5.65	6.26	6.28	5.66	4.51	3.30	2.01	1.46	1462.7	4.0
15.0	1.95	2.75	3.82	4.77	5.64	6.22	6.28	5.73	4.66	3.49	2.17	1.59	1495.5	4.1
20.0	2.07	2.87	3.91	4.80	5.61	6.16	6.24	5.77	4.78	3.67	2.32	1.70	1520.0	4.2
25.0	2.18	2.97	3.98	4.80	5.54	6.06	6.16	5.78	4.88	3.82	2.45	1.80	1535.9	4.2
30.0	2.28	3.05	4.03	4.77	5.45	5.92	6.05	5.75	4.95	3.94	2.57	1.90	1543.2	4.2
35.0	2.37	3.11	4.05	4.72	5.32	5.76	5.91	5.70	4.99	4.05	2.68	1.98	1541.7	4.2
40.0	2.44	3.16	4.05	4.64	5.17	5.56	5.74	5.60	5.00	4.13	2.76	2.05	1531.5	4.2
45.0	2.50	3.19	4.03	4.54	4.99	5.34	5.54	5.48	4.98	4.18	2.84	2.10	1513.4	4.1
50.0	2.54	3.20	3.98	4.41	4.80	5.11	5.32	5.34	4.93	4.21	2.89	2.15	1488.0	4.1
60.0	2.58	3.16	3.83	4.10	4.34	4.57	4.80	4.95	4.74	4.19	2.94	2.20	1412.5	3.9
70.0	2.55	3.06	3.59	3.70	3.81	3.94	4.18	4.46	4.45	4.06	2.92	2.20	1306.1	3.6
80.0	2.46	2.88	3.27	3.23	3.21	3.28	3.50	3.88	4.05	3.84	2.82	2.14	1173.9	3.2
90.0	2.32	2.64	2.89	2.71	2.61	2.60	2.82	3.22	3.57	3.52	2.66	2.03	1021.6	2.8

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CHARLESTON WV  
LATITUDE: 38 DEGREES 22 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.57	2.23	3.18	4.28	5.16	5.60	5.30	4.78	4.00	3.07	1.93	1.33	1294.8	3.5
10.0	1.79	2.44	3.37	4.39	5.19	5.59	5.33	4.92	4.29	3.45	2.27	1.63	1360.5	3.7
15.0	1.89	2.52	3.44	4.42	5.16	5.54	5.30	4.95	4.39	3.61	2.42	1.73	1382.5	3.8
20.0	1.97	2.60	3.49	4.42	5.11	5.45	5.25	4.96	4.48	3.76	2.55	1.83	1397.1	3.8
25.0	2.05	2.66	3.53	4.40	5.03	5.34	5.16	4.94	4.53	3.88	2.67	1.92	1404.2	3.8
30.0	2.12	2.71	3.54	4.35	4.92	5.21	5.05	4.89	4.57	3.97	2.77	1.99	1403.6	3.8
35.0	2.17	2.74	3.54	4.28	4.79	5.04	4.91	4.81	4.57	4.05	2.86	2.06	1395.5	3.8
40.0	2.21	2.75	3.52	4.19	4.63	4.85	4.75	4.71	4.55	4.10	2.93	2.11	1380.2	3.8
45.0	2.24	2.76	3.48	4.08	4.46	4.65	4.58	4.59	4.51	4.13	2.99	2.15	1358.6	3.7
50.0	2.26	2.74	3.42	3.95	4.27	4.43	4.38	4.44	4.44	4.13	3.02	2.18	1329.6	3.6
60.0	2.25	2.68	3.25	3.64	3.83	3.93	3.92	4.08	4.22	4.06	3.04	2.20	1250.9	3.4
70.0	2.19	2.55	3.01	3.25	3.32	3.35	3.39	3.64	3.91	3.90	2.98	2.17	1146.5	3.1
80.0	2.09	2.37	2.71	2.81	2.78	2.78	2.83	3.13	3.52	3.64	2.85	2.09	1023.0	2.8
90.0	1.94	2.15	2.37	2.33	2.22	2.19	2.26	2.58	3.06	3.30	2.66	1.95	882.3	2.4

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: HUNTINGTON WV  
 LATITUDE: 38 DEGREES 22 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.65	2.39	3.36	4.57	5.39	5.82	5.58	4.98	4.11	3.17	2.01	1.47	1355.8	3.7
10.0	1.90	2.63	3.58	4.70	5.42	5.80	5.61	5.14	4.41	3.57	2.36	1.74	1427.4	3.9
15.0	2.01	2.73	3.65	4.73	5.39	5.74	5.58	5.17	4.52	3.74	2.52	1.86	1451.7	4.0
20.0	2.11	2.82	3.71	4.73	5.33	5.66	5.52	5.18	4.61	3.89	2.67	1.97	1468.2	4.0
25.0	2.19	2.89	3.75	4.71	5.25	5.54	5.43	5.15	4.67	4.02	2.80	2.07	1476.5	4.0
30.0	2.27	2.95	3.77	4.66	5.14	5.40	5.31	5.10	4.70	4.13	2.91	2.16	1476.8	4.0
35.0	2.33	2.99	3.77	4.59	5.00	5.23	5.16	5.03	4.71	4.21	3.00	2.24	1469.0	4.0
40.0	2.38	3.01	3.75	4.50	4.83	5.03	4.99	4.92	4.69	4.26	3.08	2.30	1453.7	4.0
45.0	2.41	3.02	3.71	4.38	4.66	4.82	4.81	4.79	4.64	4.29	3.14	2.35	1431.4	3.9
50.0	2.43	3.01	3.65	4.24	4.45	4.59	4.60	4.64	4.57	4.29	3.18	2.38	1401.4	3.8
60.0	2.43	2.94	3.47	3.90	3.99	4.06	4.11	4.26	4.35	4.23	3.20	2.41	1319.1	3.6
70.0	2.37	2.80	3.22	3.48	3.45	3.46	3.55	3.80	4.03	4.06	3.14	2.38	1209.4	3.3
80.0	2.26	2.61	2.90	3.00	2.88	2.86	2.96	3.27	3.63	3.79	3.01	2.29	1079.0	3.0
90.0	2.10	2.36	2.53	2.48	2.30	2.25	2.35	2.68	3.15	3.44	2.80	2.15	930.1	2.5

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CASPER WY  
LATITUDE: 42 DEGREES 55 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.16	3.19	4.54	5.83	6.94	7.88	7.99	7.02	5.52	3.84	2.42	1.87	1803.8	4.9
10.0	2.70	3.71	4.99	6.10	7.06	7.93	8.15	7.40	6.14	4.56	3.08	2.45	1958.2	5.4
15.0	2.95	3.94	5.17	6.18	7.06	7.89	8.15	7.52	6.39	4.88	3.39	2.72	2018.2	5.5
20.0	3.18	4.15	5.32	6.23	7.02	7.80	8.11	7.60	6.61	5.17	3.67	2.97	2066.0	5.7
25.0	3.39	4.33	5.44	6.24	6.94	7.67	8.01	7.63	6.78	5.43	3.93	3.20	2101.2	5.8
30.0	3.58	4.48	5.53	6.21	6.82	7.50	7.87	7.61	6.91	5.65	4.16	3.42	2123.6	5.8
35.0	3.74	4.60	5.58	6.15	6.66	7.28	7.68	7.54	7.00	5.84	4.37	3.60	2132.8	5.8
40.0	3.89	4.70	5.60	6.05	6.46	7.01	7.44	7.43	7.04	5.98	4.55	3.77	2128.9	5.8
45.0	4.00	4.77	5.59	5.93	6.23	6.72	7.17	7.28	7.03	6.09	4.69	3.91	2113.2	5.8
50.0	4.09	4.80	5.54	5.77	5.98	6.41	6.87	7.08	6.98	6.16	4.81	4.02	2086.1	5.7
60.0	4.19	4.79	5.34	5.35	5.38	5.69	6.16	6.57	6.75	6.17	4.95	4.17	1994.0	5.5
70.0	4.19	4.65	5.02	4.82	4.68	4.84	5.31	5.89	6.35	6.02	4.95	4.21	1853.7	5.1
80.0	4.07	4.40	4.58	4.18	3.89	3.96	4.37	5.08	5.79	5.72	4.82	4.13	1672.3	4.6
90.0	3.84	4.04	4.03	3.46	3.09	3.04	3.42	4.16	5.08	5.26	4.56	3.94	1457.7	4.0

# AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)

SITE: CHEYENNE WY  
LATITUDE: 41 DEGREES 9 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	2.42	3.36	4.52	5.59	6.29	7.12	7.12	7.02	6.20	5.26	3.91	2.60	1717.6	4.7
10.0	3.00	3.87	4.93	5.81	6.36	7.13	7.13	7.12	6.48	5.78	4.59	3.26	1859.7	5.1
15.0	3.26	4.10	5.09	5.88	6.35	7.08	7.08	7.11	6.56	5.99	4.89	3.56	1914.8	5.2
20.0	3.50	4.30	5.22	5.91	6.30	7.00	7.00	7.05	6.60	6.17	5.16	3.84	1958.4	5.4
25.0	3.73	4.47	5.32	5.90	6.22	6.87	6.87	6.95	6.60	6.30	5.39	4.10	1990.3	5.5
30.0	3.92	4.61	5.39	5.87	6.10	6.70	6.70	6.82	6.56	6.40	5.59	4.32	2010.3	5.5
35.0	4.10	4.73	5.43	5.80	5.94	6.49	6.49	6.64	6.49	6.46	5.76	4.52	2018.2	5.5
40.0	4.24	4.82	5.44	5.69	5.75	6.25	6.25	6.43	6.37	6.48	5.89	4.69	2013.9	5.5
45.0	4.36	4.88	5.41	5.56	5.55	5.99	5.99	6.19	6.23	6.45	5.97	4.83	1999.3	5.5
50.0	4.45	4.90	5.35	5.40	5.32	5.71	5.71	5.93	6.05	6.39	6.02	4.94	1973.2	5.4
60.0	4.54	4.87	5.14	4.99	4.78	5.05	5.05	5.30	5.58	6.14	6.01	5.06	1885.9	5.2
70.0	4.52	4.71	4.81	4.47	4.14	4.29	4.29	4.57	4.99	5.74	5.83	5.04	1753.9	4.8
80.0	4.37	4.43	4.36	3.86	3.45	3.52	3.52	3.77	4.30	5.21	5.51	4.88	1585.1	4.3
90.0	4.12	4.05	3.82	3.18	2.74	2.71	2.71	2.96	3.51	4.55	5.04	4.60	1383.8	3.8

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: ROCK SPRINGS WY  
 LATITUDE: 41 DEGREES 36 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	7	N	D		
0.0	2.32	3.43	4.82	6.13	7.38	8.11	8.03	7.06	5.78	4.11	2.61	2.05	1884.3	5.2
10.0	2.88	3.97	5.29	6.40	7.50	8.14	8.16	7.42	6.41	4.87	3.30	2.66	2041.1	5.6
15.0	3.13	4.21	5.48	6.48	7.49	8.09	8.16	7.53	6.67	5.20	3.61	2.94	2101.4	5.8
20.0	3.37	4.42	5.63	6.53	7.44	7.99	8.10	7.59	6.89	5.50	3.90	3.20	2149.0	5.9
25.0	3.58	4.61	5.75	6.53	7.34	7.85	7.99	7.61	7.06	5.77	4.17	3.44	2183.3	6.0
30.0	3.77	4.77	5.84	6.50	7.20	7.65	7.84	7.58	7.19	5.99	4.41	3.66	2204.1	6.0
35.0	3.94	4.89	5.89	6.43	7.02	7.42	7.63	7.50	7.27	6.18	4.62	3.85	2211.3	6.1
40.0	4.08	4.99	5.90	6.32	6.80	7.13	7.39	7.38	7.30	6.33	4.80	4.02	2204.8	6.0
45.0	4.19	5.05	5.88	6.17	6.55	6.83	7.11	7.21	7.28	6.43	4.95	4.17	2186.8	6.0
50.0	4.28	5.09	5.83	6.00	6.27	6.50	6.80	7.01	7.22	6.50	5.06	4.28	2156.1	5.9
60.0	4.37	5.06	5.61	5.55	5.61	5.73	6.07	6.47	6.96	6.50	5.19	4.43	2055.4	5.6
70.0	4.35	4.90	5.25	4.97	4.84	4.84	5.20	5.78	6.53	6.32	5.18	4.45	1904.8	5.2
80.0	4.22	4.62	4.77	4.29	3.99	3.93	4.26	4.96	5.92	5.98	5.03	4.36	1713.0	4.7
90.0	3.97	4.23	4.18	3.52	3.12	2.97	3.29	4.03	5.17	5.49	4.74	4.14	1486.0	4.1

AVERAGE DAILY TOTAL TERRESTRIAL INSOLATION ESTIMATES (KWH/SQ. M)  
 SITE: SHERIDAN WY  
 LATITUDE: 44 DEGREES 46 MINUTES

ARRAY TILT	AVERAGE DAILY AMOUNTS BY MONTH												ANNUAL AMOUNT	AVERAGE DAY
	J	F	M	A	M	J	J	A	S	O	N	D		
0.0	1.63	2.49	3.79	4.85	5.93	6.80	7.34	6.33	4.73	3.17	1.86	1.39	1534.0	4.2
10.0	2.03	2.86	4.15	5.07	6.04	6.86	7.50	6.68	5.26	3.75	2.35	1.80	1656.6	4.5
15.0	2.21	3.03	4.30	5.13	6.05	6.83	7.51	6.80	5.48	4.01	2.58	1.99	1704.0	4.7
20.0	2.37	3.18	4.42	5.17	6.02	6.77	7.49	6.87	5.66	4.24	2.79	2.17	1741.6	4.8
25.0	2.52	3.31	4.52	5.18	5.96	6.67	7.41	6.91	5.81	4.45	2.98	2.33	1769.0	4.8
30.0	2.66	3.42	4.59	5.16	5.87	6.53	7.30	6.90	5.92	4.63	3.16	2.48	1785.9	4.9
35.0	2.78	3.51	4.63	5.12	5.74	6.36	7.14	6.85	6.00	4.78	3.31	2.61	1792.3	4.9
40.0	2.88	3.58	4.65	5.04	5.58	6.15	6.94	6.76	6.04	4.90	3.44	2.73	1788.0	4.9
45.0	2.97	3.63	4.64	4.94	5.40	5.91	6.69	6.63	6.04	4.99	3.55	2.83	1773.2	4.9
50.0	3.03	3.65	4.60	4.81	5.20	5.66	6.44	6.46	6.00	5.05	3.64	2.91	1750.3	4.8
60.0	3.11	3.64	4.45	4.49	4.72	5.08	5.82	6.03	5.82	5.06	3.74	3.02	1673.7	4.6
70.0	3.10	3.54	4.19	4.07	4.15	4.39	5.07	5.45	5.49	4.95	3.75	3.04	1558.3	4.3
80.0	3.02	3.35	3.84	3.57	3.50	3.65	4.22	4.74	5.03	4.71	3.65	2.99	1408.7	3.9
90.0	2.86	3.09	3.41	3.00	2.85	2.90	3.37	3.94	4.45	4.35	3.46	2.86	1233.7	3.4